Engineering Evaluation/Cost Analysis Non-Time Critical Removal Action Tank Farm IR-6

Naval Station Treasure Island
Hunters Point Annex
San Francisco, California
November 13, 1995

Engineering Field Activity West
Naval Facilities Engineering Command
900 Commodore Drive
San Bruno, California 9406-2402

EXECUTIVE SUMMARY

This Engineering Evaluation/Cost Analysis (EE/CA) was performed in accordance with current U.S. Environmental Protection Agency (EPA) and U.S. Navy guidance documents for a non-time critical removal action under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This EE/CA summarizes the results of the EE/CA process, characterizes the site, identifies removal action objectives, describes removal action alternatives, contains analysis of these alternatives, and describes the recommended removal action alternative for contaminated soils at the IR-6 Tank Farm site of the Hunters Point Annex.

The Tank Farm at Hunters Point Annex was a fuel storage facility used by the Navy from early 1940s until 1976, at which time it was used by Triple A Machine Shop. The tanks were used to store diesel fuel and lube oil for distribution through underground utility lines to shipping berths. Contaminants that have been identified in the soil during previous investigations include TPH-diesel, lead, PCBs and cPAHs. While the groundwater beneath the site is also contaminated, the scope of this removal action includes only the soil contamination.

CERCLA and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300) define removal actions as the cleanup or removal of released hazardous substances, actions to monitor the threat of release of hazardous substances, and actions to mitigate or prevent damage to public health or welfare or the environment. The NCP includes provisions for the "removal of drums, barrels, tanks, or other bulk containers that contain or may contain hazardous substances or pollutants or contaminants-where it will reduce the likelihood of spillage; leakage; exposure to humans, animals, or the food chain..."

The purpose of the EE/CA is to identify and analyze alternative removal actions to address the soil contamination at the Tank Farm. Three alternatives were identified and considered:

1. No Action
2. Excavation and Disposal
3. Excavation, Thermal Desorption, and Disposal

Based on this analysis, the Navy recommends Excavation and Disposal as the selected alternative. This alternative best meets the NCP criteria of overall protection of human health, compliance with applicable relevant and appropriate requirements (ARARs), long-term effectiveness, reduction of toxicity through treatment, short-term effectiveness, implementability, cost, and state and community acceptance.

Contents

Contents, Continued

1. Introduction

This Engineering Evaluation/Cost Analysis (EE/CA) evaluates proposed removal action alternatives for the soils removal action at the Tank Farm IR-6 (Tank Farm) site of the Hunters Point Annex (HPA). The Tank Farm was a fuel storage facility used by the Navy from the early 1940s until 1974, and by Triple A Machine Shop from 1976 to 1986. The Navy used the tanks at the site to store diesel fuel, lubrication oil, and possibly Stoddard solvents. The tanks were reportedly used by Triple A to store unknown materials. Contaminants observed in soil during previous investigations include total petroleum hydrocarbons (TPH-diesel and TPH-oil), polychlorinated biphenyls (PCBs), lead, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). While the groundwater beneath the site is also contaminated, the scope of this removal action includes only the non-TPH soil contamination.

This EE/CA was developed in accordance with Contract Task Order No. 1, effective January 11, 1995 by the Navy Public Works Center - SFBAY (PWC) Contract No. N68378-94-D-5885 dated August 5, 1994. It has been prepared in accordance with the Navy Installation Restoration (IR) program and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance. The removal action at the Tank Farm site is being performed for the Department of the Navy, Engineering Field Activities West (EFA WEST) by Navy PWC.

The United States Department of the Navy (Navy) is the lead agency for environmental response actions at HPA. As the lead agency for this proposed removal action, the Navy has final approval authority of the recommended alternative selected and overall public participation activities. The Navy is working in cooperation with the United States. Environmental Protection Agency Region IX (EPA), California Department of Toxic Substances Control (DTSC), and California Regional Water Quality Control Board (RWQCB) in the implementation of this removal action. The final decision on the removal action alternative selected will be documented in an Action Memorandum.

1.1 Facility Background

Hunters Point Annex is located in southeast San Francisco on a peninsula extending east into San Francisco Bay, as shown on Figure 1-1. The Navy property encompasses 965 acres, with approximately 500 acres on land and the rest in the bay. The facility is bounded on three sides by San Francisco Bay, and by the Hunters Point district of San Francisco, which consists of public and private housing and commercial and industrial buildings, on the fourth side. HPA was operated as a commercial dry-dock facility from 1869 until December 1939, when the property was purchased by the Navy. The Navy leased the property to the Bethlehem Steel Company until December 1941, when the Navy took possession and began operating the shipyard to provide accelerated production of liberty ships during World War II.

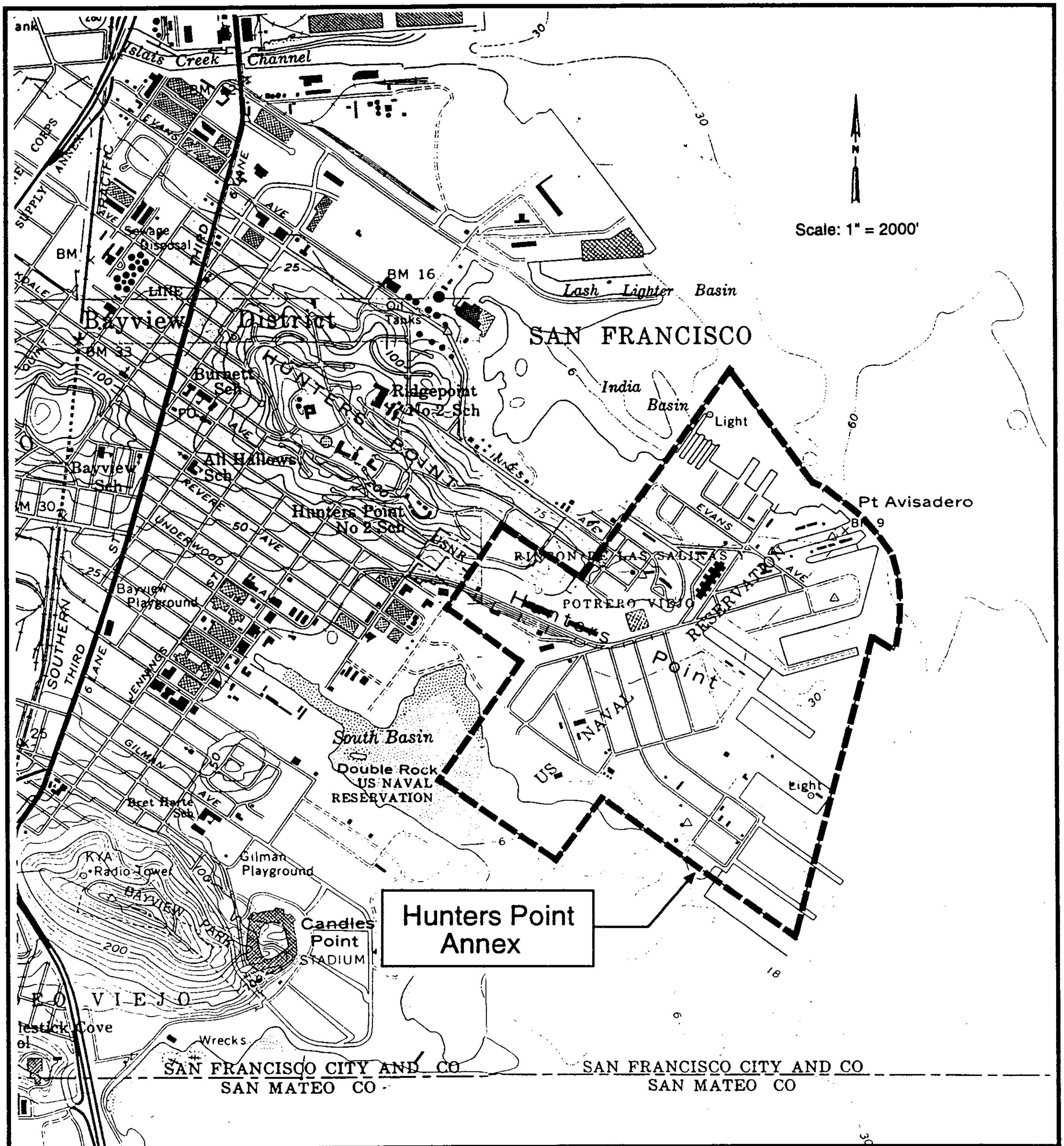


Figure 1-1
Site Vicinity Map
Tank Farm IR-6
Hunters Point Annex

102594.01.AM

CH2M HILL

In 1974, the Navy ceased shipyard operations, placed the facility in industrial reserve, and transferred control to its Office of the Supervisor of Shipbuilding, Conversion, and Repair, San Francisco. In May 1976, Triple A Machine Shop leased most of the site and began operating a commercial ship repair facility. Triple A subleased portions of the site to private warehousing, industrial, and commercial firms. In 1986, the San Francisco District Attorney's Office (DA) charged Triple A with illegally disposing of hazardous wastes at about 20 locations throughout HPA (DA, 1986). These locations, referred to as Triple A sites, are included in the Navy's IR program. In 1992, Triple A was convicted on five counts of illegal hazardous waste disposal.

Between 1986 and 1988, an extensive IR program was developed and implemented to characterize the soil and groundwater contamination in areas of HPA. Based on the results of IR program investigations, the site was placed on the National Priorities list (NPL) in 1989. As a result, the Navy is required to perform a Remedial Investigation/Feasibility Study (RI/FS) in accordance with CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). RI/FS activities are completed, underway, or planned for 20 IR sites at HPA as part of the IR program. These sites were divided into five operable units (OUs) as defined in the Federal Facilities Agreement (FFA) signed between October 29, 1991 and January 22, 1992 by the Navy, EPA, RWQCB, and DTSC. The FFA is a binding, legally enforceable agreement that sets lead and support agency roles and establishes the general direction and specific schedules for key cleanup milestones.

In 1990, the U.S. Department of Defense placed the site on the Base Closure List, which mandated that it be remediated and made available for nondefense use. It was designated as a "B" site by the Agency for Toxic Substances and Disease Registry in 1991, meaning that it poses no imminent threat but may have the potential to pose a long-term threat to human health.

In April 1992, the Navy proposed a new approach for the RI/FS program in which the facility would be divided into five parcels to expedite remedial action and land reuse. The approach was described in the Technical Memorandum, Operable Unit V Redefinition (HLA, 1992a). This approach, which has been implemented, consists of three primary components:

- Facility-wide investigations
- RI/FSs for the parcels
- Interim action studies of interim-action-based OUs

This removal action fits in with the overall cleanup of Parcel B. A draft RI for Parcel B is due in early 1996, and a draft FS is due around May 1996.

1.2 SACM Approach

The Superfund Accelerated Cleanup Model (SACM) approach was implemented by the EPA to render Superfund cleanups more timely and efficient. According to the EPA "Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA" (EPA, 1993), key elements of SACM are:

- A continuous process for assessing site-specific conditions and the need for action
- Cross-program coordination of response planning
- Prompt risk reduction through early action
- Appropriate cleanup of long-term environmental problems
- Early public notification and participation
- Early initiation of enforcement activities

The EPA has recommended that the SACM be considered for all Superfund activities when its implementation is consistent with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and CERCLA. This removal action is being initiated in order to facilitate early action in accordance with the SACM, which calls for early actions to reduce immediate risks to human health or the environment while other studies (e.g., facility-wide studies) continue.

1.3 EE/CA Objectives

CERCLA and NCP define removal actions to include "the cleanup or removal of released hazardous substances from the environment, such actions as may necessarily be taken in the event of the threat of release of hazardous substance into the environment, such action as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removal material, or the taking of such other actions as may be necessary to prevent, minimize or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release." The EPA has classified removal actions into three types based on the circumstance surrounding the release or threat of release: emergency, time critical, and non-time critical. The removal action being considered for contaminated soils at the Tank Farm has been determined to be a non-time critical removal, since onsite action will be taken more than 6 months after commencement of the planning period.

For non-time critical removal actions, the NCP requires that an EE/CA be prepared to analyze removal alternatives for the site. The objectives of the EE/CA are to:

- Satisfy environmental review requirements for removal actions
- Satisfy administrative record requirements for documentation of removal action selection
- Provide a framework for evaluating and selecting alternative technologies

The EE/CA is to identify the objectives of the removal action and to analyze the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. In this way, the EE/CA is similar to the RI/FS conducted for remedial actions, but is more streamlined. The EPA guidance for non-time critical removal actions states that "Data to characterize the nature and extent of contamination should be limited to those needed to support specific objectives of the non-time critical removal action ....only a few viable alternatives relevant to the EE/CA objectives should be identified and analyzed" (EPA, 1993).

1.4 Community Involvement

This EE/CA is being issued in accordance with the Community Relations Plan (HLA, 1989) to facilitate public involvement in the decision-making process. For non-time critical removal actions, the NCP requires a 30-day public comment period on the EE/CA. The public is encouraged to review and comment on the proposed removal activities described in this EE/CA. After the public comment period is over, the remediation project manager (RPM) is required to prepare a written response to significant comments received during the comment period. The response to comments will be included in the administrative record file.

To gain a more thorough understanding of the activities associated with this removal action, the public is encouraged to review the administrative record for this activity. The administrative record has been established at the following location:

Engineering Field Activity, West
900 Commodore Drive
San Bruno, CA 94066

Documents are also available at the following locations:

San Francisco Public Library
Main Branch
Civic Center
San Francisco, CA 94102

San Francisco Public Library
Waden Branch
5075 3rd Street
San Francisco, CA 94124

1.5 EE/CA Organization

The remainder of this EE/CA is organized as follows:

- **Section 2 - Site Characterization.** Presents the site description and background, a summary of the previous environmental response actions, a discussion of the nature and extent of contamination, and a streamlined risk evaluation.

- **Section 3 - Identification of Removal Action Objectives.** Discusses the scope of the removal action and issues that have bearing on the removal action schedule; reviews regulatory requirements that affect the development of removal action objectives; and finally presents the specific objectives of the removal action for the Tank Farm.

- **Section 4 - Development of Removal Action Alternatives.** Discusses the range of possible response actions that could meet the removal action objectives; identifies appropriate technologies; and identifies removal action alternatives to be evaluated.

- **Section 5 - Evaluation of Removal Action Alternatives.** Describes each alternative and evaluates its effectiveness, implementability, and cost.

- **Section 6 - Comparative Analysis of Removal Action Alternatives.** Compares the effectiveness, implementability, and cost of each alternative.

- **Section 7 - Recommended Removal Action Alternative.**

- **Section 8 - References.**

2. Site Characterization

The information for this site characterization was taken from various sources, including Draft Operable Unit II Remedial Investigation Report (HLA, 1992b), Draft Final Interim Action Operable Unit II Summary Alternative Selection Report [ASR] (HLA, 1993b), and Draft Construction Summary Report, Tank Farm Removal Action (HLA, 1993c).

2.1 Site Description and Background

2.1.1 Site Location

The Tank Farm site is located within Parcel B at Hunters Point Annex. Parcel B is the northernmost parcel within the HPA facility and is bounded by San Francisco Bay to the north, east, and west. Parcel B is bounded by Parcel A to the southwest and Parcel C to the southeast. Previously, the Tank Farm was designated as part of OU II.

The Tank Farm is located along the southern border of Parcel B. The site is situated at the intersection of Lockwood and Robinson Streets. Buildings 123 and 134 are located across Lockwood Street; Buildings 101 and 110 are located across Robinson street. Figure 2-1 shows the locations of Parcel B and the Tank Farm relative to other sites at the facility.

2.1.2 Site History

Aerial photographs indicate that the Tank Farm was constructed in 1942 at what had been the shoreline in 1935. Two piers, observed in a 1935 photo, may have been incorporated into the fill placed north and west of the site between 1935 and 1948. The Tank Farm was used by the Navy until 1974 to store diesel fuel and lube oil, which were distributed through underground lines to the berths north and northeast of the site (WESTEC, 1984).

The Tank Farm formerly consisted of the following facilities:

- One 210,000-gallon diesel tank in a bermed area
- Eight 12,000-gallon vertical diesel fuel tanks in a bermed area
- One 12,000-gallon vertical lube oil tank in a bermed area
- Concrete tank support racks for eight horizontal 3,000-gallon lube oil tanks
- Two pump houses (Buildings 111 and 112), containing sumps and piping

Refer to Figure 2-2 for a plan view of the Tank Farm site.

In the early 1940s, diesel oil reportedly spilled from a ruptured 12,000-gallon vertical diesel fuel tank. Reportedly, the contents of the tank overflowed the berm, and the spilled diesel oil was removed to the Oil Reclamation Ponds (WESTEC, 1984).

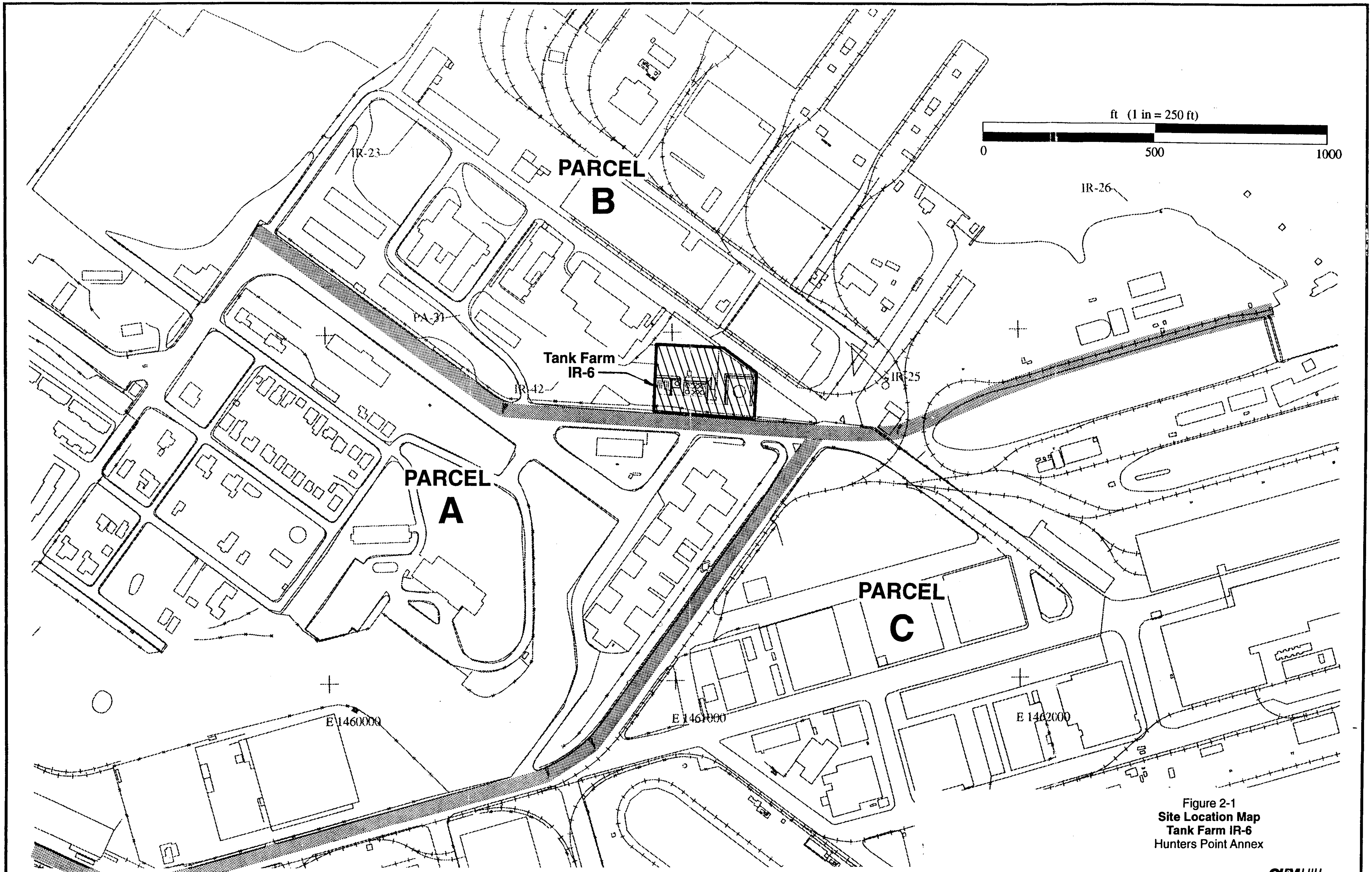


Figure 2-1
Site Location Map
Tank Farm IR-6
Hunters Point Annex

102594.01.AM

CH2M HILL

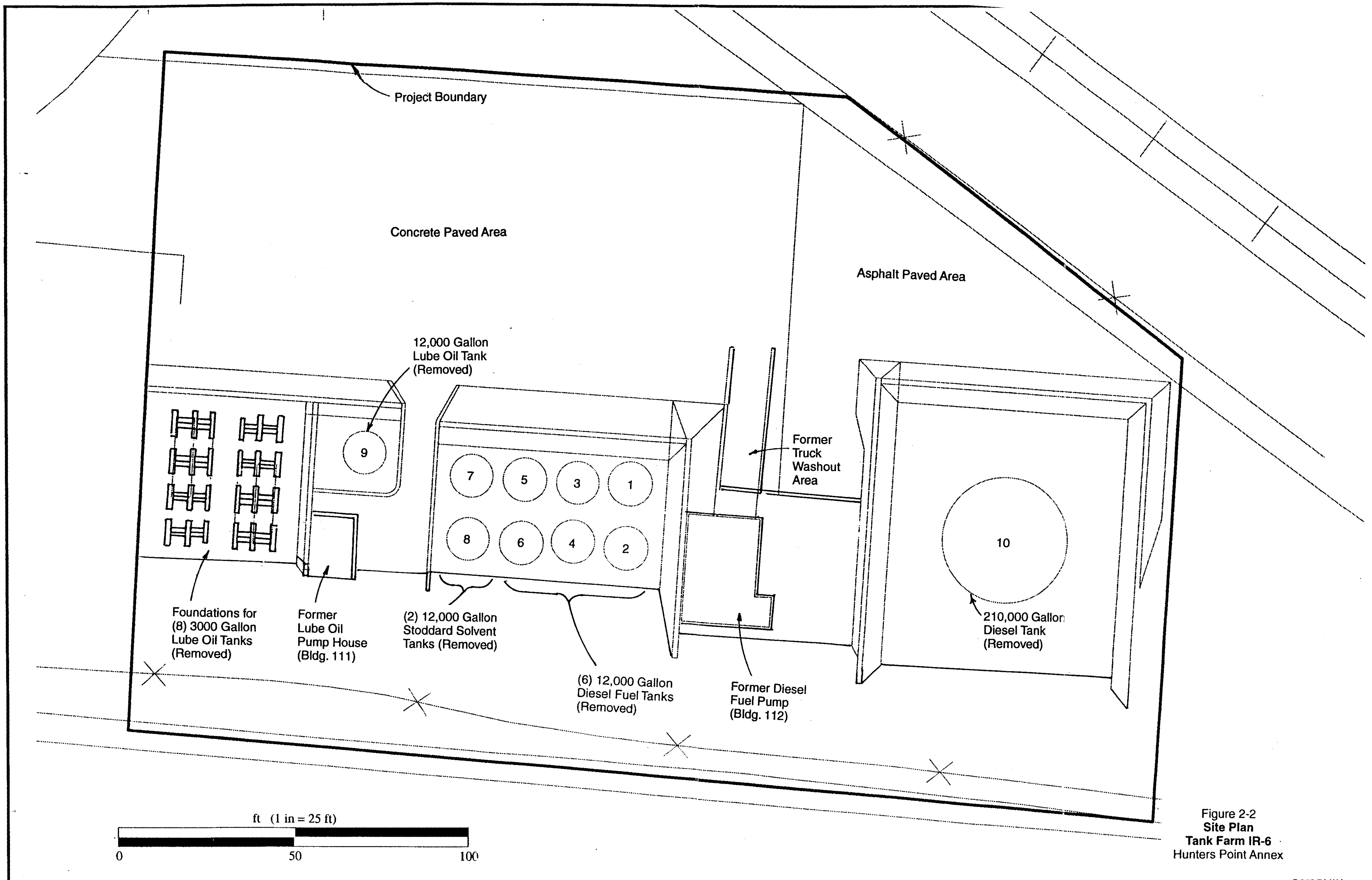


Figure 2-2
Site Plan
Tank Farm IR-6
Hunters Point Annex

CH2M HILL

102594.01.AM

Triple A Machine Shop reportedly used the Tank Farm from 1976 until they vacated the facility in 1986. Stoddard solvent may have been stored in two of the 12,000-gallon tanks (HLA, 1990). In 1986, Triple A was charged with illegally disposing of hazardous waste at several locations throughout HPA, including the Tank Farm (DA, 1986). In 1992, Triple A was convicted on five counts of illegal hazardous waste disposal.

All of the Tank Farm facilities, including the tanks, pump houses, support racks, and associated piping within the bermed areas, were removed as part of the Tank Farm Removal Action (HLA, 1993c). Observations that were made during the removal action and a summary of the conditions at the site at completion of removal were addressed in an addendum to the ASR (HLA, 1993a). Underground piping in the paved areas of the Tank Farm has not been removed.

2.1.3 Structures and Topography

The Tank Farm is located within the triangular area formed by the intersection of Lockwood and Robinson Streets. The site includes a relatively flat paved area, four bermed areas, and a steep, densely vegetated slope. The flat area, which covers approximately half of the site, is paved with a combination of concrete and asphalt. The bermed areas, which previously contained tanks, are formed by import soil, concrete walls, and the slope. The floors of the bermed areas, which currently have geosynthetic liners, range from approximately 2 to 4 feet above the elevation of the paved area. The sloped area is located along the south sides of the berms and extends from the paved area to Robinson Street. The elevation of Robinson Street is approximately 20 feet above the paved area. Figure 2-2 presents a plan view of the Tank Farm site.

Surface drainage appears to be primarily sheet-flow runoff collected by an onsite storm drain system and discharged into San Francisco Bay through several outfalls. No naturally occurring channelized drainage exists; any pre-existing drainage channels have been filled or modified by construction. Utilities at the site include sewer lines/manholes, stormwater drainage pipes, abandoned fuel lines, power lines and telephone lines.

2.1.4 Geology and Hydrogeology

The geology of the Tank Farm generally consists of Artificial Fill (Qaf), possible Slope Debris and Ravine Fill (Qrs), Undifferentiated Upper Sand Deposits (Quus) and Undifferentiated Sedimentary Deposits (Qu) overlying Franciscan Bedrock. Bay Mud Deposits (Qbm) were generally not observed. The Artificial Fill generally extends from the ground surface to as deep as 40 feet below ground surface (bgs), where bay mud, undifferentiated upper sands, or bedrock is encountered. Undifferentiated upper sands are generally absent where the bedrock surface is above mean sea level. The bedrock consists primarily of serpentinite, argillite, and siltstone and contains elevated levels of various heavy metals.

Two aquifers have been identified beneath the Tank Farm site and are designated the A-aquifer and Franciscan Bedrock Aquifer. The uppermost or A-aquifer generally consists of saturated artificial Fill and Undifferentiated Upper Sand Deposits with localized areas of Undifferentiated Sedimentary Deposits. The top of the A-aquifer is defined by the water table at 4 to 8 feet bgs. The bottom of the A-aquifer is defined by the upper surface of the Franciscan Bedrock. Groundwater flow in the A-aquifer is generally toward San Francisco

Bay. At the Tank Farm site, the upper part of the Franciscan Bedrock, which consists of weathered serpentinite, has been designated the Bedrock Aquifer; it appears to be in hydraulic communication with the overlying A-aquifer (HLA, 1992b).

2.1.5 Meteorology

The climate in the Hunters Point area is characterized by partly cloudy, cool summers with little precipitation and mostly clear, mild winters with rain storms. This climate is the result of the Pacific high pressure system, the thermal contrast between the land and the ocean, and regional topography. Meteorological data from San Francisco Airport (SFO), eight miles south of HPA, indicate that the prevailing wind direction is from the west-northwest; therefore, airborne dust and volatile emissions are expected to be transported primarily east-southeast. The average annual precipitation at SFO is 19.7 inches; the average temperature is 57.2 degrees Fahrenheit.

2.1.6 Surrounding Population

Land use within two miles of HPA was evaluated through discussions with the San Francisco Department of City Planning and a review of city planning and related literature. The area adjacent to HPA is heavily developed and predominantly industrial/commercial (44 percent of land use) with some residential areas (18 percent), streets and freeways (about 33 percent), and developable land (5 percent). There is both heavy and light industry in the area.

Approximately 22,600 people reside within 2 miles of the center of HPA. There are no hospitals or nursing homes, but there are four schools totaling 2,500 students and 16 daycare centers totaling 800 children. Recreational activities on the Bay primarily consist of fishing, boating and windsurfing (HLA, 1992b).

2.1.7 Sensitive Ecosystems

Most of HPA is covered by buildings or pavement. The vegetated areas comprise four distinct terrestrial habitats; in decreasing area they are ruderal (disturbed), landscape, non-native grassland, and salt marsh. All four habitats are somewhat disturbed as a result of past and current activities with ruderal habitats the most highly disturbed. San Francisco Bay at HPA is characterized by strong tidal currents and physical structures such as riprap and docks, which serve as artificial habitats for estuarine life. The marine environment is disturbed as a result of activities in the Bay.

Several hundred species of plants and animals are believed to exist at or near HPA. A list is being compiled as part of the environmental risk assessment and will include the following: terrestrial and marine plants and algae; benthic and water-column-dwelling marine animals such as clams, mussels, amphipods, and fish; insects; amphibians; reptiles; birds; and mammals. Some sensitive, threatened, or endangered species such as the salt marsh harvest mouse and the osprey may be included (HLA, 1992b).

2.2 Previous Response Actions

2.2.1 Previous Investigations

Several investigations were conducted prior to, or in conjunction with, the removal action at the Tank Farm site. Two subsurface investigations were performed including a limited investigation by EMCON and an RI by HLA. In addition, four investigations of the contents of the tank were conducted prior to their removal. These investigations were conducted by HLA in 1988, by American Environmental Management Corporation (AEMC) in 1989, and by PRC Environmental Management (PRC) and DECON in 1992.

EMCON conducted a limited investigation of the surface soils at the Tank Farm site in 1986 (EMCON, 1987). During the investigation, surface soils samples were visually examined but not analyzed. However, petroleum odors and visible contamination were noted.

HLA conducted an RI at the Tank Farm to determine the extent of soil contamination associated with spills from the tanks. During the reconnaissance phase of the RI, 34 samples were collected at 19 locations in the bermed areas at depths of 0 to 2 feet bgs. The primary phase RI consisted of two soil-sampling events. During October and November 1989, 26 soil borings were drilled with a portable rig using a continuous flight auger. During May and June 1990, seven more soil borings and 10 monitoring wells were installed using a hollow-stem auger rig. The primary contaminants observed include volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene, and xlyenes (BTEX) and chlorinated solvents, PAHs, petroleum hydrocarbons (TPH as diesel and total oil and grease), and several metals. Figure 2-3 shows the locations of samples obtained during the RI.

HLA's tank investigation included sounding the tanks for the presence of fluid or residual sludge using a weighted steel tape. Only three tanks, Tanks 2, 7, and 10, contained measurable amounts of free fluid, and these were sampled and analyzed for VOCs, semivolatile organic compounds, CAM 17 metals, organochlorine pesticides, and PCBs. The contents of Tanks 2 and 10 appeared to be petroleum hydrocarbons and commonly associated constituents. Arsenic, chromium, copper, and zinc were detected in Tank 10. Zinc, phenanthrene, and 2-methylnaphthalene were detected in the sample from Tank 2. Tank 7 appeared to contain mostly nonhalogenated solvent (possibly Stoddard solvent), ethylbenzene, and total xylenes (HLA, 1988). Refer to Figure 2-2 for tank locations.

AEMC's investigation consisted of sampling tanks containing sufficient fluid. The number of samples AEMC collected and the analytes are unknown; however, according to HLA's RI report, a sample from Tank 7 contained PCBs at 9 milligrams per liter (mg/l) (HLA, 1992b).

In April 1992, PRC sampled the contents of several of the tanks as well as free water in the truck ramp and in the bermed area containing Tanks 1 through 8. Samples were collected from Tanks 1, 6, 7, and 8. Tanks 3, 4, and 5 did not contain enough liquid to sample; Tank 9 was empty. The contents from Tanks 1 and 6 were composited for sampling. The sample indicated that the tanks contained acetone, pyrene, bis(2ethylhexyl)phthalate, di-n-octylphthalate, phenanthrene, methylene chloride, TPH, aldrin, endosulfan I, and zinc. Tank 2 contained acetone, 2-butanone, 2-methylnaphthalene, methylene chloride, Freon 113, 1,1,1-trichloroethane, 1,4-dichloroethane, TPH, and lead. Tank 7 contained acetone,

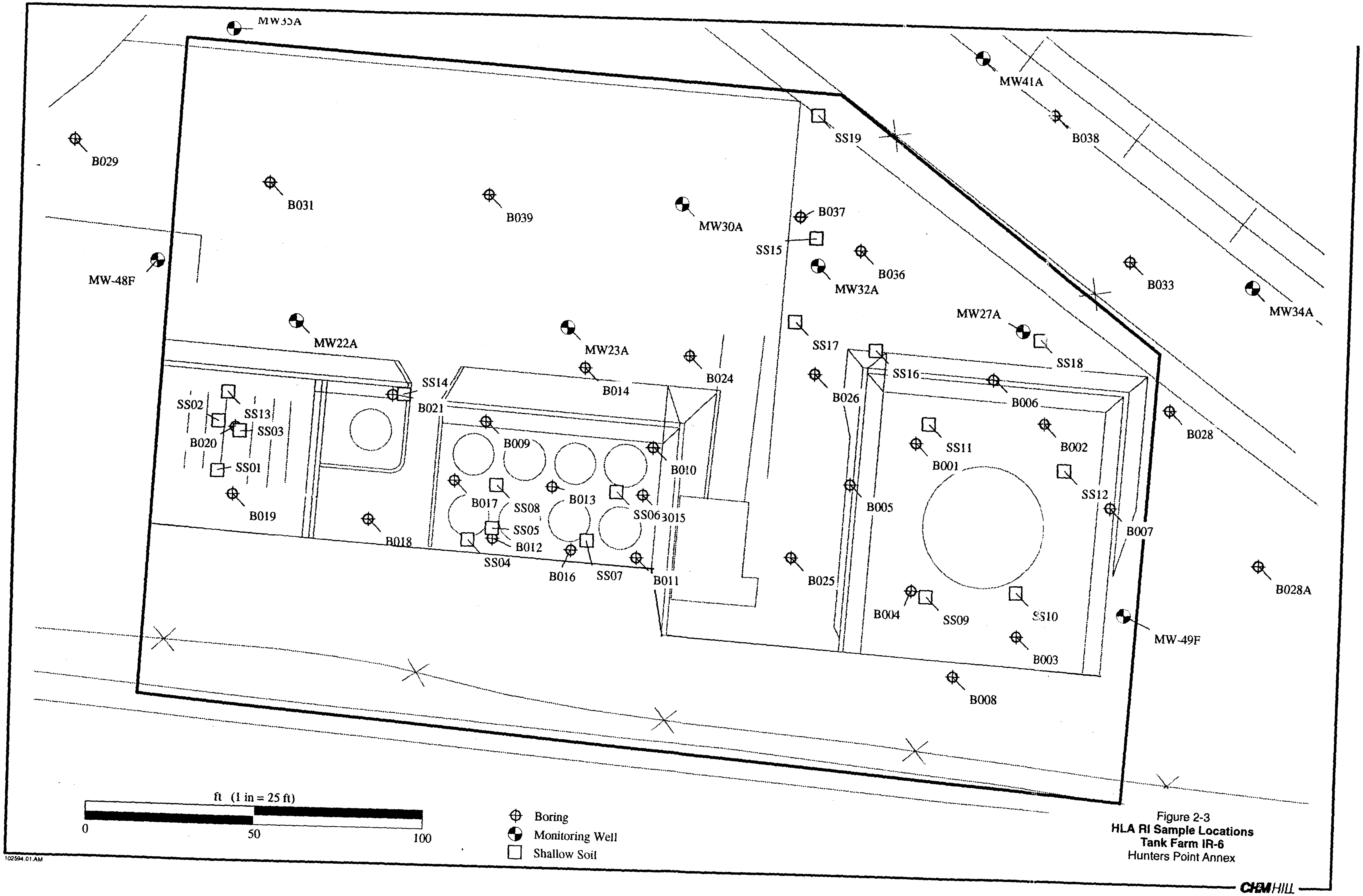


Figure 2-3
HLA RI Sample Locations
Tank Farm IR-6
Hunters Point Annex

benzene, xylene, pyrene, 2-methylnaphthalene, naphthalene methylene chloride, Freon 113, 1,1,1-trichloroethane, 1,4-dichloroethane, and TPH. Tank 8 contained acetone, 2-butanone, toluene, pyrene, bis(2ethylhexyl)phthalate, di-n-octylphthalate, flouranthene, chrysene, methylene chloride, TPH, aldrin, endosulfan I, zinc, iron, manganese, and copper. The sample from the truck ramp contained pyrene, bis(2ethylhexyl)phthalate, TPH, toluene, total xylenes, 1,4-dichlorobenzene, and several metals. The water sample from the bermed area containing Tanks 1 through 8 contained trichloroethene, TPH, toluene, benzene, and several metals. Sampling data is presented in the Draft Construction Summary Report for the Tank Farm removal action (HLA, 1993c).

DECON collected samples of the tank contents for PCB analysis in November 1992. Samples were obtained from all tanks, except Tank 9 which could not be sampled because it was empty. PCBs were not detected in any of the samples. One sample was collected from the Tank 9 outflow line in March 1993. Aroclor 1260 was detected at 0.54 milligrams per liter in that sample (HLA, 1993c).

2.2.2 Previous Removal Actions

Removal actions were conducted at the Tank Farm from February to June 1993. These actions consisted of the following activities:

- Removal of asbestos-containing materials from piping, pumps, and tanks.
- Removal of petroleum fuel and solvents remaining in the tanks, pipes and the Building 112 sump.
- Removal of tanks and tank piping;
- Removal of the concrete foundations for the vertical and horizontal tanks;
- Demolition of the two pump houses (Buildings 111 and 112);

Approximately 140 cubic yards of soil within the bermed areas was excavated during the removal actions. This soil was placed in rolloff bins, sampled, transported and disposed at the Chemical Waste Management Class I disposal facility in Kettleman Hills, California.

2.2.3 Previous Project Activities

In February 1995, CH2M HILL performed confirmation sampling based on the results of HLA's RI investigation. The confirmation samples were obtained primarily in areas that were identified by HLA as containing high levels of lead, PCBs, or cPAHs; however, some additional samples were obtained in areas not previously sampled. Thirteen samples, designated CF-1 through CF-13, were obtained during this sampling event. In October 1995, CH2M HILL performed a second round of confirmation sampling. Fifteen samples, designated CF-14 through CF-28, were obtained in the bermed areas that previously held the diesel fuel tanks. In addition, two 4-point composite samples were obtained from the inner slopes of the berms around the diesel fuel tanks. Sample CB-1 was obtained from the berms that formerly contained the eight 12,000-gallon vertical diesel fuel tanks. Sample CB-2 was obtained from the berms that formerly contained the 210,000-gallon diesel tank. The objective of these investigations was to verify the locations of contamination, and to further delineate the areas to be included in this removal action. Figure 2-4 shows the locations of CH2M HILL's confirmation samples.

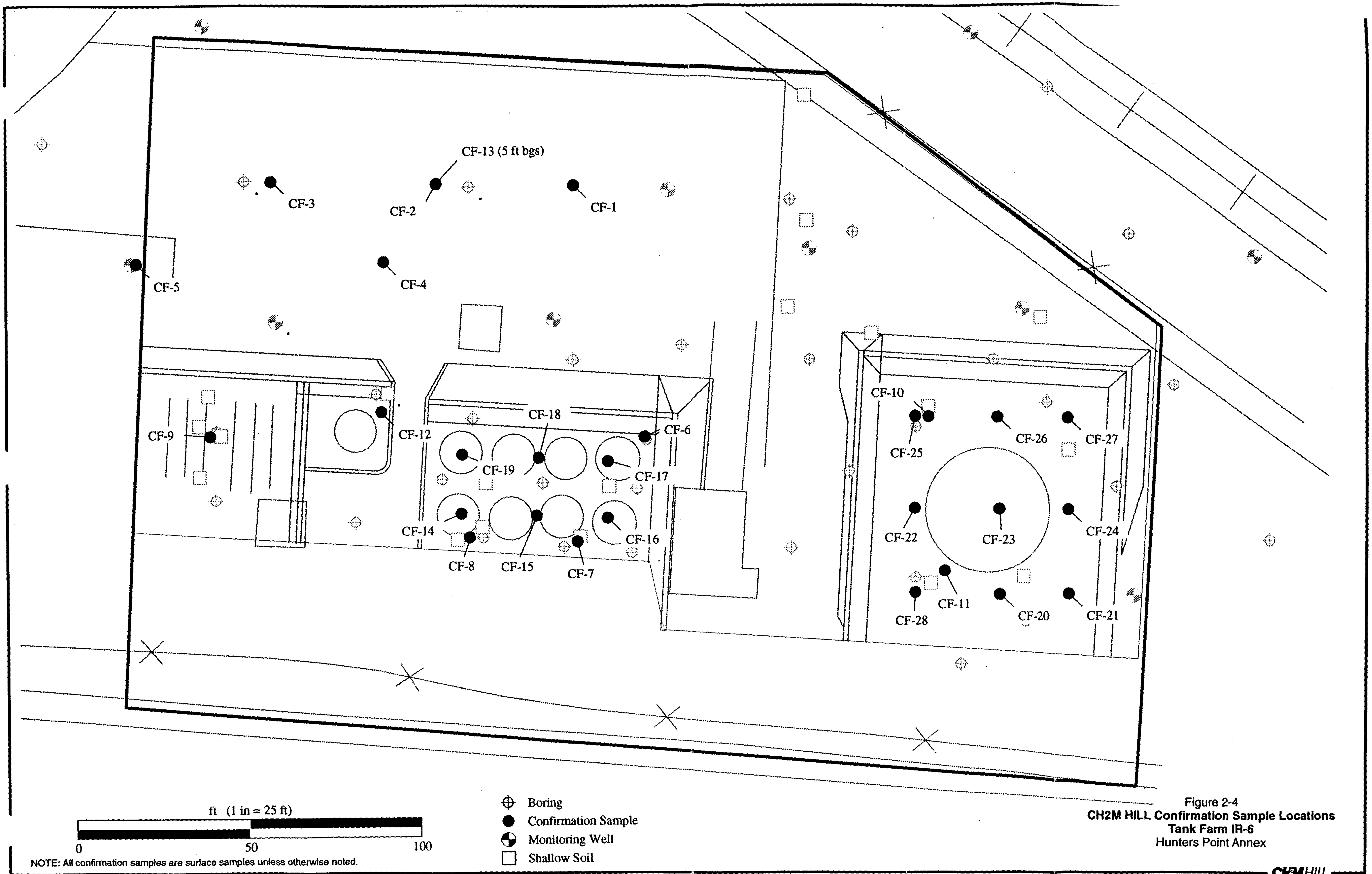


Figure 2-4
CH2M HILL Confirmation Sample Locations
Tank Farm IR-6
Hunters Point Annex

The confirmation samples were analyzed for lead, PCBs, cPAHs, and/or pesticides. One sample analyzed for PCBs, CF-13, confirmed contamination, but at much lower levels than were encountered by HLA. PCBs were also detected in sample CF-4, a location not previously sampled. All other samples analyzed for PCBs failed to detect contamination. All confirmation samples analyzed for cPAHs also failed to detect contamination. The sample analyzed for pesticides, CF-28, also failed to detect contamination. All confirmation samples analyzed for lead detected contamination, but at lower levels than were encountered by HLA.

2.3 Nature and Extent of Contamination

The main potential sources of contamination at the Tank Farm are spills from the tanks used by the Navy to store diesel fuel, lubrication oil, and possibly Stoddard solvents. These tanks were also reportedly used by Triple A to store unknown materials. The potential non-point sources of contamination at the Tank Farm include naturally occurring geologic materials, anthropogenic sources, and artificial fill materials.

The primary contaminants observed in the soil at the Tank Farm consist of petroleum hydrocarbons (TPH-diesel and TPH-oil), PCBs, lead and cPAHs. Other secondary contaminants have also been detected at the site, including VOCs such as BTEX and chlorinated solvents, PAHs, and several metals. Tables summarizing the results of HLA's subsurface investigation are included in Appendix I of the RI (HLA, 1992b). Table 2-1 presents the results of CH2M HILL's confirmation sampling. As discussed in Section 2.2.3, contaminant concentrations encountered during CH2M HILL's confirmation sampling were generally lower than concentrations encountered by HLA. It is likely that much of the shallow metals and cPAH contamination encountered by HLA in the bermed areas was excavated during the removal action conducted in June 1993.

The ambient levels of several metals at HPA were calculated by PRC and are presented in the Draft Calculation of Hunters Point Ambient Levels (EFA West, 1995). Table 2-2 presents the minimum and maximum concentration of metals detected at the Tank Farm site as well as the estimated ambient levels. The contaminant concentration information presented in Table 2-2 is based on data obtained during HLA's RI investigation. As shown, metals present at above ambient levels include: antimony, arsenic, beryllium, cadmium, copper, lead, selenium, silver, and zinc. No ambient level was available for manganese. It is assumed that the manganese concentrations at the site are at ambient levels; therefore, manganese is not considered a contaminant of concern for this removal action. This issue will be evaluated further during the baseline risk assessment that is being performed for Parcel B.

Detections of metals above ambient levels were encountered primarily in shallow or surface samples in the bermed areas. Lead, zinc, and antimony, the most commonly detected contaminants, were found in each of the four bermed areas; the remaining metals were detected in one or more of the bermed areas. Several metals, including silver, lead, copper, arsenic, and antimony had at least one detection in the paved areas of the site. Figure 2-5 presents the locations and concentrations of metal detections above the estimated ambient levels. The concentrations in the figure represent the maximum concentration for each location. CH2M HILL confirmation samples are not included on Figure 2-5; however, the results of the confirmation sampling are presented in Table 2-1.

Table 2-1 Summary of Confirmation Sampling Results Tank Farm IR-6 Hunters Point Annex								
	Lead		PCBs (Aroclor 1260)[a]		cPAHs		Pesticides (Aldrin)[b]	
Sample	Concentration (mg/kg)	Detection Limit (mg/kg)	Concentration (mg/kg)	Detection Limit (mg/kg)	Concentration (mg/kg)	Detection Limit (mg/kg)	Concentration (mg/kg)	Detection Limit (mg/kg)
CF-1	*	*	ND	0.1	*	*	*	*
CF-2	*	*	ND	0.1	*	*	*	*
CF-3	*	*	ND	0.1	*	*	*	*
CF-4	*	*	1.6	0.5	ND	2	*	*
CF-5	*	*	ND	0.1	ND	0.5	*	*
CF-6	48	0.5	*	*	*	*	*	*
CF-7	280	0.5	*	*	*	*	*	*
CF-8	1500	0.5	*	*	*	*	*	*
CF-9	*	*	*	*	ND	2	*	*
CF-10	210	0.5	*	*	*	*	*	*
CF-11	32	0.5	*	*	*	*	*	*
CF-12	*	*	*	*	ND	2	*	*
CF-13	*	*	1.2		*	*	*	*
CF-14	602	13.5	*	*	*	*	*	*
CF-15	406	13.4	*	*	*	*	*	*
CF-16	233	14.1	*	*	*	*	*	*
CF-17	208	13.6	*	*	*	*	*	*
CF-18	806	13.1	*	*	*	*	*	*
CF-19	306	13.9	*	*	*	*	*	*
CF-20	14.9	0.13	*	*	*	*	*	*
CF-21	196	1.37	*	*	*	*	*	*
CF-22	4.24	0.14	*	*	*	*	*	*
CF-23	16.1	0.13	*	*	*	*	*	*
CF-24	45.8	0.69	*	*	*	*	*	*
CF-25	20.2	0.14	*	*	*	*	*	*
CF-26	65	1.37	*	*	*	*	*	*
CF27	138	1.35	*	*	*	*	*	*
CF-28	12.4	0.15	*	*	*	*	ND	2.2
CB-1	453	12.2	*	*	*	*	*	*
CB-2	191	1.22	*	*	*	*	*	*

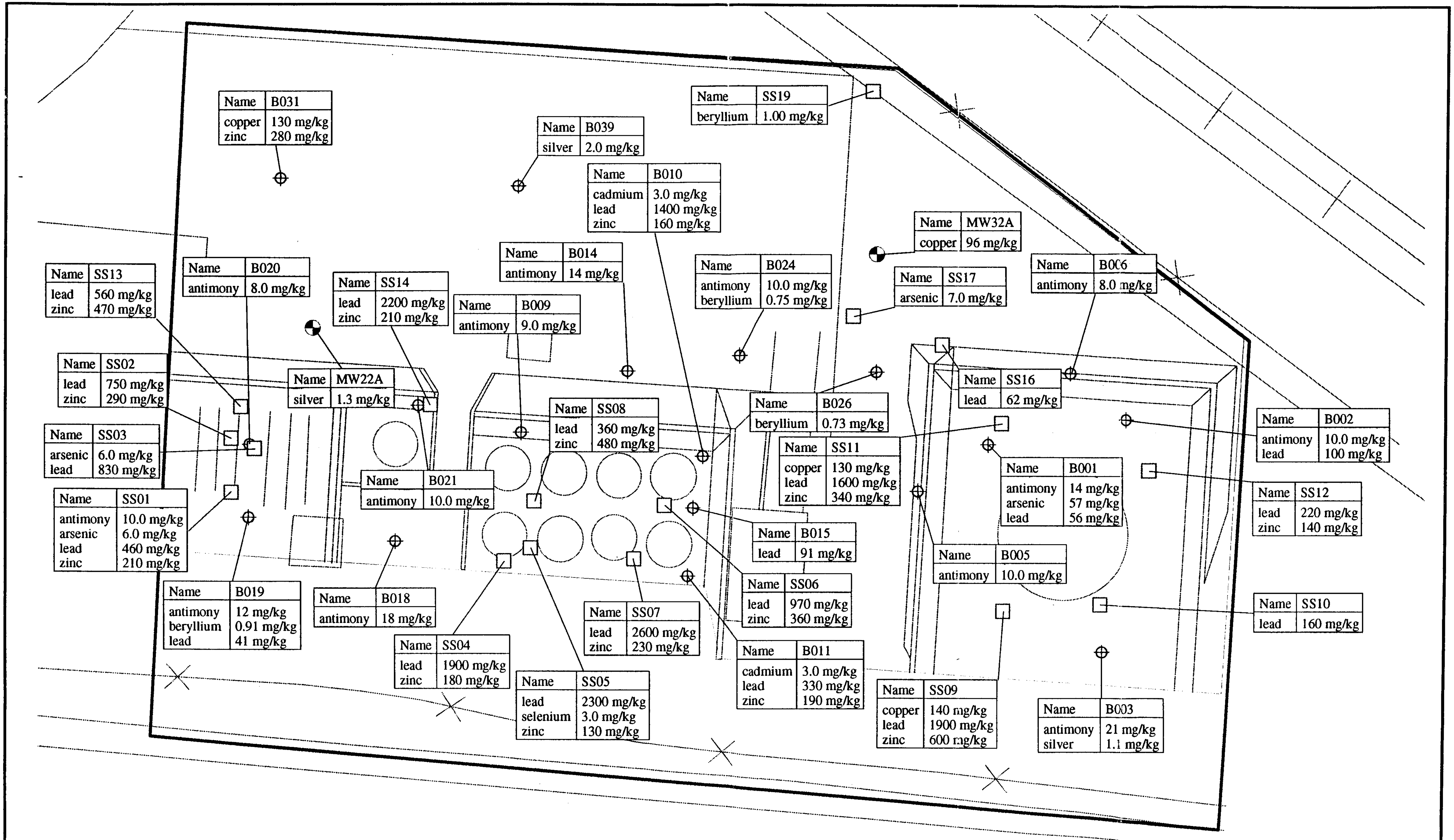
Notes:
a The sample was analyzed for the full suite of PCBs; however, Aroclor 1260 was the constituent of concern based on HLA's testing
b The sample was analyzed for the full suite of pesticides; however, Aldrin was the constituent of concern based on HLA's testing
* The sample was not analyzed for this constiuent

Table 2-2
Ambient Concentration of Metals
Tank Farm IR-6
Hunters Point Annex

Chemical	Number of Samples Analyzed	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Estimated Ambient Level[a] (mg/kg)	Number of Samples > Ambient Levels
Antimony	123	8	29	7.17	21
Arsenic	123	0.31	57	5.73	4
Barium	123	9	428	593.21	0
Beryllium	123	0.18	1	0.71	6
Cadmium	123	0.94	3	2	2
Chromium	123	40	1910	2238 - 160,111	0
Cobalt	123	8	208	1656 - 118,546	0
Copper	123	6	140	91.54	4
Lead	123	0.67	2580	34.05	29
Mercury	123	0.1	0.98	1.79	0
Molybdenum	123	2	2	2.37	0
Nickel	123	22	3390	3201 - 907,631	0
Selenium	123	0.57	3	1.57	1
Silver	123	0.31	2	1.07	4
Thallium	123	0.38	0.79	0.84	0
Vanadium	123	8	102	129.26	0
Zinc	123	17	597	120.24	18

Notes:

a Table 8, *Summary of Ambient Levels by Soil Type, Hunter's Point Annex*. Values presented are for undifferentiated fill. Chromium, cobalt, and nickel background values are correlated to the range of magnesium concentrations present.



ft (1 in = 25 ft)

0 50 100

Boring
Monitoring Well
Shallow Soil

NOTE: Concentrations Shown are maximum concentration of the compound detected at each location.

Figure 2-5
Detections Of Metals Above Ambient Levels
Tank Farm IR-6
Hunters Point Annex

102594.01.AM

CH2M HILL

PCBs were detected at depths up to approximately 5 feet, primarily in the concrete-paved area outside of the former lube oil facility. PCBs were also detected in the berm that contained the 12,000-gallon lube oil tank (Tank 9). Based on information presented in HLA's RI, PCBs were found in Tank 7 (Figure 2-2); however, no PCBs were detected in the soil near this area. It is likely that the PCB contamination in the concrete-paved area is due to leakage from a storm drain line that runs from the Tank 9 bermed area. The drain line, which is located approximately 5 feet below grade, runs near the areas where PCBs were detected. Refer to Figure 2-6 for the locations and concentrations of PCB detections.

Carcinogenic PAHs were encountered throughout the site. In the bermed areas and asphalt-paved area, the cPAHs were predominantly encountered in shallow or surface samples. In the concrete-paved area, cPAHs were detected at up to approximately 5 feet below grade. The highest concentration of cPAHs were encountered in the bermed area that formerly contained the eight 3,000-gallon lube oil tanks. Figure 2-7 shows the locations and total concentrations of cPAH detections.

TPH contamination was encountered throughout the site and extends to depths of approximately 12 to 15 feet bgs. The highest concentrations of TPH contamination were encountered in the bermed areas and are likely the result of tank spills. TPH contamination is not within the scope of this removal action.

Groundwater contamination at the site includes the soil contaminants. BTEX compounds and chlorinated solvents are relatively mobile in soil and groundwater and are found 150 feet downgradient of the Tank Farm. PAHs, TPH-diesel, TPH-oil, and metals are fairly immobile, with the exception of arsenic.

The evaluation of the nature and extent of contamination is based primarily on the results of HLA's RI investigation. HLA concluded that although many qualifiers were added to the data, a final evaluation of the data set indicated that the data are of good overall quality. The data was deemed usable for site assessment, risk assessment, and feasibility studies. A Data Validation and Evaluation Report is presented as Appendix C of the RI (HLA 1992b).

2.4 Streamlined Risk Evaluation

A baseline public health and environmental evaluation (PHEE) was performed as a component of the OU II RI conducted by HLA in 1992 (HLA, 1992b). Data from the RI was used to estimate the potential human health risks associated with the chemicals detected at the OU II sites. Soil ingestion, inhalation, and dermal contact exposure pathways were considered for construction workers, office workers, and potential future residents. Both the average case and reasonable maximum exposure (RME) case were evaluated. The PHEE results for the Tank Farm site are summarized below.

Pathways and contaminants exceeding the threshold level for noncarcinogenic effects (hazard index exceeding 1.0) were:

- Inhalation of dust by construction workers, primarily due to manganese, in the RME scenario.

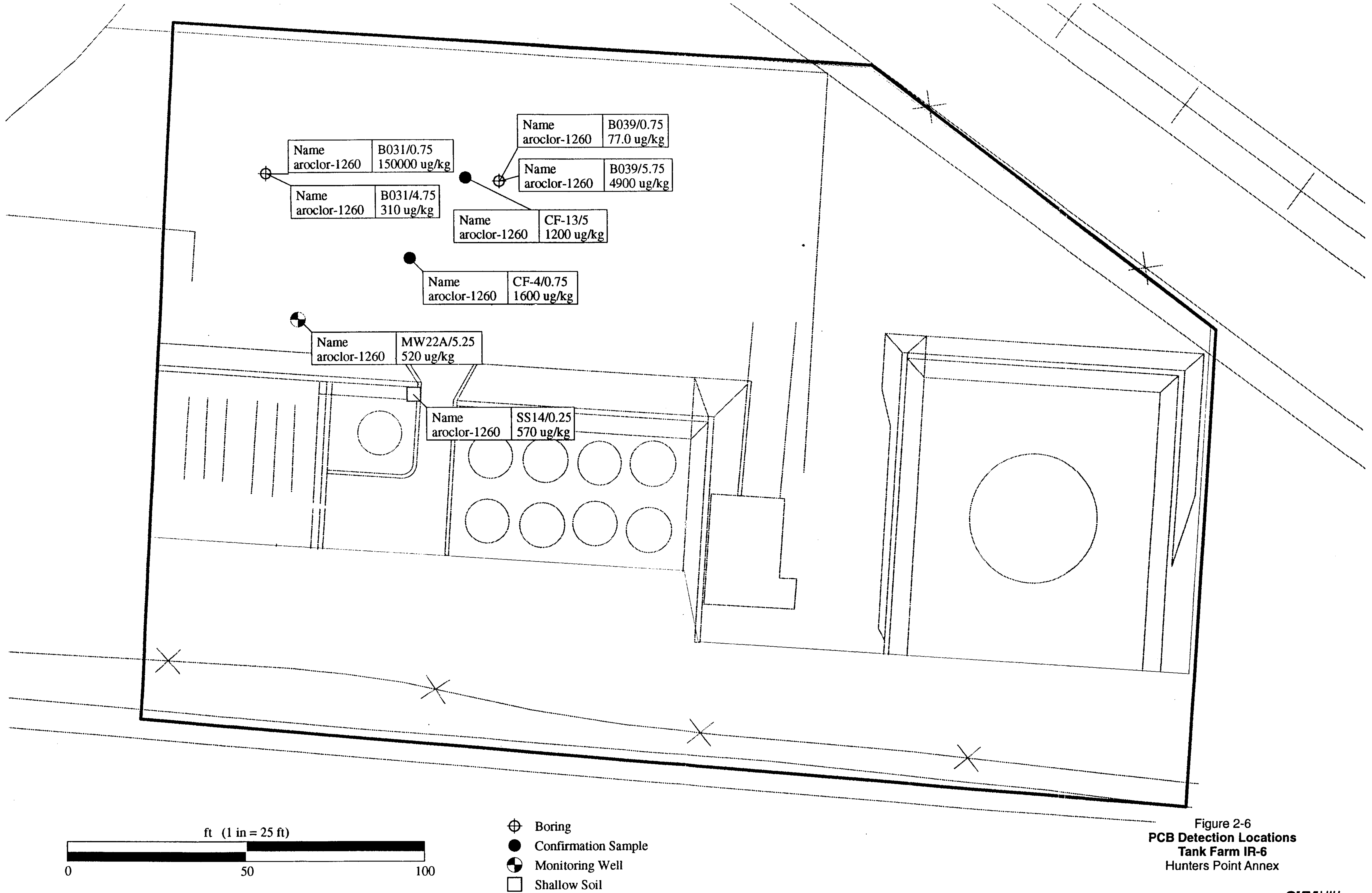


Figure 2-6
PCB Detection Locations
Tank Farm IR-6
Hunters Point Annex

CH2M HILL

102584.01.AM

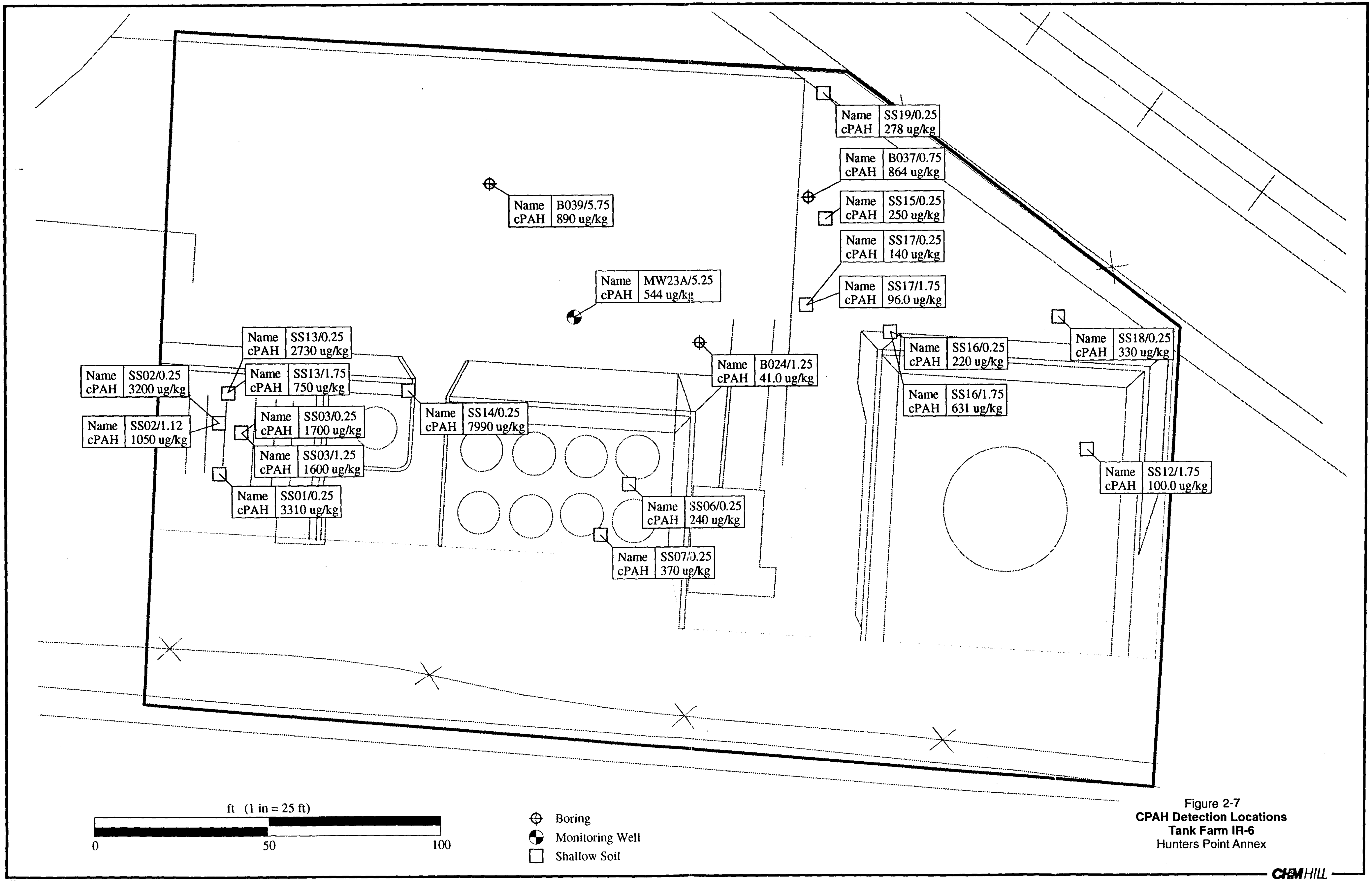


Figure 2-7
CPAH Detection Locations
Tank Farm IR-6
Hunters Point Annex

- Ingestion of soil and homegrown produce by resident children due to simultaneous exposure to a number of chemicals, including lead, in the RME scenario. (Construction workers may also be affected by ingestion of soil containing lead.)

- Simultaneous exposure of residents via multiple pathways to a number of chemicals in the average and RME scenarios for children and the RME scenario for adults.

Pathways and contaminants exceeding the EPA target risk for cancer (a 1-in-10,000 probability that an exposed individual will develop cancer from potential exposure to carcinogens, i.e., 1×10^{-4}) were:

- Ingestion of soil by residents due to Aroclor 1260, in the average and RME scenarios for children and the RME scenario for adults.

- Dermal contact with soil, primarily due to Aroclor 1260, in both the average and RME scenarios for resident children and the RME scenario for office workers and resident adults.

Subsequently, a removal action was implemented at the Tank Farm as discussed in Section 2.2.2. Some tanks, piping, foundations, and pump houses were removed along with approximately 140 cubic yards of soils within the bermed areas.

To determine the potential threat to human health posed by exposure to the contaminated soils under current site conditions, a simplified risk screening evaluation has been performed. Soil concentrations for the non-TPH contaminants of concern are compared to preliminary remediation goals (PRGs) published by EPA Region IX. These PRGs represent soil contaminant concentrations that correspond to a target cancer risk of 1×10^{-6} or a hazard index of 1. Exposure pathways considered include ingestion, dust inhalation, and dermal adsorption.

Because the Tank Farm is targeted for future residential use, residential PRGs were selected for this screening risk evaluation. It is assumed that all soils down to the water table are potentially accessible for future exposure due to excavation or grading activities. The results of the PRG comparison are summarized in Table 2-3. Table 2-3 also includes the background concentrations for the inorganic compounds for comparison.

Arsenic, beryllium, chromium, lead, manganese, and nickel concentrations detected in Tank Farm soils exceeded residential PRGs. However, except for arsenic and lead, all of the concentrations detected were within the range of ambient levels seen in the undifferentiated fill at Hunters Point. Four soil samples had arsenic levels that were above the residential PRG and above ambient levels. Two of these samples were in the bermed area that formerly contained the eight 3000-gallon lube oil tanks. The other was outside the northwest corner of the 210,000-gallon diesel tank bermed area. There were numerous exceedances of the residential PRG for lead within the bermed areas.

Eight soil samples exceeded the residential PRG for PCBs. These samples were located in the concrete-paved area. Several PAHs exceeded their respective residential PRGs as well. These samples were primarily in the concrete-paved area and in the bermed area that formerly contained the eight 3000-gallon lube oil tanks bermed area. One sample, located

Table 2-3
Comparison of Soil Contaminant Concentrations to PRGs
Tank Farm IR-6
Hunters Point Annex

Chemical	Number of Samples Analyzed	Minimum Detected Value	Maximum Detected Value	Estimated Ambient Level[a]	Residential PRG[b]	Number Exceeding Residential PRG	Industrial PRG[b]	Number Exceeding Industrial PRG	SSL for Groundwater Protection[c]	Number Exceeding SSL
Metals										
Antimony	123	8	29	7.17	31.1	0	680	0	NA	
Arsenic	123	0.31	57	5.73	0.38	100	2.4	45	15	1
Barium	123	9	428	593.21	5300	0	100000	0	32	116
Beryllium	123	0.18	1	0.71	0.14	92	1.1	0	180	0
Cadmium	123	0.94	3	2	9[e]	0	850	0	6	0
Chromium[d]	123	40	1910	2,238-160,111	210	69	450	26	NA	
Cobalt	123	8	208	1,656-118,546	4600	0	97000	0	NA	
Copper	123	6	140	91.54	2800	0	63000	0	NA	
Lead	123	0.67	2580	34.05	130[e]	19	1000	7	NA	
Manganese	123	169	4640		380	93	7800	0	NA	
Mercury	123	0.1	0.98	1.79	23	0	510	0	3	0
Molybdenum	123	2	2	2.37	380	0	8500	0	NA	
Nickel	123	22	3390	3,201-907,631	150[e]	103	34000	0	21	123
Selenium	123	0.57	3	1.57	380	0	8500	0	3	0
Silver	123	0.31	2	1.07	3800	0	8500	0	NA	
Thallium	123	0.38	0.79	0.84	5.4[f]	0	120	0	0.4	8
Vanadium	123	8	102	129.26	540	0	12000	0	NA	
Zinc	123	17	597	120.24	23000	0	100000	0	42000	0
Organics										
Benzo(a)anthracene	123	0.087	0.83	ND	0.61	1	2.6	0	0.7	1
Benzo(b)fluoranthene	123	0.041	2.5	ND	0.61	3	2.6	0	4	0
Benzo(a)pyrene	123	0.091	1.3	ND	0.061	7	0.26	2	4	0
Dibenzo(a,h)anthracene	123	0.06	0.084	ND	0.061	1	0.26	0	11	0
Aldrin	105	0.012	0.13	ND	0.026	1	0.11	1	0.005	3
Arochlor-1260 mod 8080	18	0.077	150	ND	0.066[g]	8	0.34	8	NA	

All concentrations in mg/kg.

PRG - Preliminary Remedial Goal
SSL - Soil Screening Level

a Table 8, Summary of Ambient Levels by Soil Type, Hunters Point Annex. Values presented are for undifferentiated fill. Chromium, cobalt, and nickel background values are correlated to the range of magnesium concentrations present.
b USEPA Region IX Preliminary Remedial Goals, Second Half 1995, September 1, 1995 (unless otherwise noted).
c USEPA Soil Screening Guidance, EPA/540/R-94/101, December 1995 (Review Draft). SSLs for metals assume a soil pH of 6.8.
d Total chromium (1/6 ratio CrVI/CrIII).
e Cal-EPA Modified PRG referenced from Preliminary Endangerment Assessment Guidance Manual, Department of Toxic Substances Control, 1994.
f PRG is for thallium oxide.
g Total PCBs, carcinogenic effects.

in the southwest corner of the 210,000-gallon diesel tank bermed area, exceeded the residential PRG for aldrin.

It should be noted that under current use conditions, only the exposed surface soils would be available for exposure under occupational (i.e., industrial) exposure conditions. A comparison of the soil concentrations to the industrial PRGs (see Table 2-3) indicates that some lead and arsenic concentrations are above both the industrial PRG and ambient levels. The same samples that exceeded the residential PRGs for PCBs and aldrin also exceeded the industrial PRGs. Fewer samples overall exceeded the industrial PRGs for PAHs.

Exposure pathways not considered by the EPA Region IX PRGs are exposure to indoor air from soil gas, exposure to groundwater contaminated by soil leachate, and ingestion via plant uptake. Because volatile organics are not a significant component of the site contamination at the Tank Farm, the indoor air pathway is not of concern. The plant uptake pathway is also not expected to be a significant contributor to the total risk that may be posed by the site contaminants given that intake via ingestion of home-grown produce is a small part of the total intake via the other pathways (i.e., ingestion, dermal contact, and dust inhalation).

Though the groundwater has been designated as a separate OU, actions taken at the Tank Farm should address soil contaminants as a potential source to groundwater. EPA's Soil Screening Guidance (EPA, 1994) contains soil screening levels (SSLs) for groundwater protection. These SSLs are a conservative estimation of the concentration of a contaminant in soil that would not result in exceedances of the acceptable concentration of a contaminant in groundwater, assuming groundwater is a source of drinking water. These SSLs represent very conservative screening levels for the Tank Farm since the groundwater at the site is brackish and is unlikely to be a potential source of drinking water.

The results of the comparison of Tank Farm soil concentrations to SSLs indicates that protection of groundwater would not drive the cleanup of any metals. All of the metal concentrations that exceed SSLs are within the range of ambient levels for Hunters Point, with the exception of the elevated levels of arsenic that have already been identified as exceeding the lower residential PRG value. As previously, the background levels for manganese are not well defined, but at this time it is believed that the manganese levels that exceed the PRGs are representative of background conditions. This will be confirmed in the baseline risk assessment. For organics, protection of groundwater only factors into consideration of potential cleanup actions for aldrin, which exceeded the SSL in three samples whereas it only exceeded the PRG in one. The presence of aldrin was not detected in the confirmation sampling, and is therefore not considered further for the removal action. It is likely that the aldrin-contaminated material was removed during the 1993 removal action.

A baseline risk assessment for Parcel B, including the Tank Farm, is ongoing. This assessment will confirm whether the residual risk in the Tank Farm at the completion of this removal action meets the remediation goals for Parcel B.

3. Identification of Removal Action Objectives

The NCP presents factors for consideration in evaluating the appropriateness of initiating a removal action. Based on the site characterization and streamlined risk evaluation presented in Section 2, conditions at the site meet the following NCP requirements for a removal action [40 CFR 300.415(b)(2)]:

- Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or food chains.

- High levels of hazardous substances or pollutants or contaminants in soils, largely at or near the surface, that may migrate.

The following sections outline the statutory framework for the removal action, the scope of the removal action, factors influencing the schedule of the removal action, and applicable or relevant and appropriate requirements to be considered. The removal action objectives are then defined based on these factors.

3.1 Statutory Framework

This removal action is taken pursuant to CERCLA and the NCP under the delegated authority of the Office of the President of the United States by Executive Order 12080 and 12580. These orders provide the Navy with authorization to conduct and finance removal actions. This removal action is non-time critical because a six month planning period was available from the time a removal action was determined to be necessary before the initiation of removal actions. The requirements for this EE/CA and its mandated public comment period provide opportunity for public input to the cleanup process. The process is also governed by the FFA.

The Navy is the lead agency for the removal action. As such, the Navy has final approval authority over the recommended alternative and all public participation activities. EFA West is the regional manager of the Navy's CERCLA program, and is therefore providing technical expertise to Hunters Point Annex to conduct activities specific to the preparation of the EE/CA and the execution of the recommended alternative.

This EE/CA complies with the requirements of CERCLA, SARA, NCP at 40 CFR Part 300, DERP at 10 USC §2701, et seq., and EO 12580. This EE/CA is being pursued under 40 CFR Part 300.415(b)(2).

3.2 Determination of Removal Scope

The removal action for the Tank Farm is focused on addressing the vadose zone soil contamination. It is meant to address only the non-TPH component of the contamination present; the TPH-contaminated soils will be addressed by a bioremediation pilot study.

Contaminated soils present below the water table will be addressed as part of the groundwater OU.

3.3 Determination of Removal Schedule

Factors affecting the schedule for the Tank Farm removal action include:

- The need to complete the bioremediation pilot study prior to September 1996 so that the results can be used in the alternatives evaluation for the Parcel B Remedial Design.

- Requirement for a 30-day public comment period on the EE/CA.

The EPA has indicated that if minimal comments are received on the EE/CA during the public comment period, the Action Memorandum can be submitted concurrently with the start of the removal action. The final schedule for this removal action will be dependent on timely regulatory approval of the EE/CA, public acceptance of the removal action, and adequate funding and contracting availability.

3.4 Applicable or Relevant and Appropriate Requirements

The NCP states, "Removal actions ... shall to the extent practical considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws" [40 CFR 300.415(i)].

The following sections provide an overview of the applicable or relevant and appropriate requirements (ARARs) process and a summary of those ARARs that potentially affect the determination of removal action objectives and identification of remedial technologies.

3.4.1 ARARs Overview

Identification of ARARs is a site-specific determination and involves a two-part analysis: first, a determination of whether a given requirement is applicable; then if it is not applicable, if it is relevant and appropriate. A requirement is deemed applicable if the specific terms of the law or regulation directly address the chemical of concern, remedial action, or place involved at the site. If the jurisdictional prerequisites of the law or regulation are not met, a legal requirement may nonetheless be relevant and appropriate if the site's circumstances are sufficiently similar to circumstances in which the law otherwise applies and it is well-suited to the conditions of the site.

A requirement must be substantive in order to constitute an ARAR for activities conducted onsite. Procedural or administrative requirements such as permits and reporting requirements are not ARARs.

In addition to ARARs, the NCP provides that where ARARs do not exist, agency advisories, criteria, or guidance are "to-be-considered" (TBC) useful "in helping to determine what is protective at a site or how to carry out certain actions or requirements" (55 Federal Register 8745). The NCP preamble states, however, that provisions in the TBC category "should not be required as cleanup standards because they are, by definition, generally neither promulgated nor enforceable, so they do not have the same status under CERCLA as do ARARs."

As the lead federal agency, the Navy has the primary responsibility for the identification of Federal ARARs at Hunters Point. As the lead State agencies, the DTSC and the RWQCB have the responsibility for identifying State ARARs. The Navy has initiated this process by identifying potential State ARARs in this draft EE/CA. The Navy requests that the State provide comments and identify any additional requirements that are deemed to be pertinent to this removal action.

Requirements of ARARs and TBCs are generally divided into three categories: chemical-specific, location-specific, and action-specific requirements. Chemical-specific and location-specific ARARs affecting the development of removal action objectives are discussed in Section 3.4.2. Other chemical-specific, location-specific, and action-specific ARARs that impact the development of removal action alternatives are presented in Section 3.4.3.

3.4.2 ARARs Affecting Removal Action Objectives

There are no promulgated federal standards that define cleanup levels for the soil contaminants being addressed at the Tank Farm. The State of California also does not have any promulgated cleanup standards for the non-TPH contaminants in soil that are addressed by this removal action.

PCB cleanup standards are provided in *A Guide on Remedial Actions at Superfund Sites with PCB Contamination* (OSWER Directive No. 9355.4-01 FS, August 1990). For residential, unrestricted land use, 1 ppm soil PCBs at the surface is recommended as a preliminary remedial goal to address threats posed by direct contact. Because this cleanup level is only guidance and is not a promulgated standard, it is a TBC.

There are no location-specific regulatory issues associated with this site that affect the development of removal action objectives. The Tank Farm is not in or near a wetlands or other sensitive habitat area. Also, there are no historic buildings, monuments, or artifact areas in the immediate vicinity of the site.

3.4.3 ARARs Affecting Removal Action Alternatives

The key question in determining requirements that may affect implementation of possible remedial technologies at the site is whether or not the contaminated soils to be managed are considered to be hazardous waste. The requirements of the Resource Conservation and Recovery Act (RCRA), as adopted by the State of California under their authorized RCRA program, are applicable if the contaminated soils are a hazardous waste and if the activity being considered as part of the remedial alternative constitutes treatment, storage, or disposal, as defined by RCRA.

Because the California RCRA regulations in Division 4.5 of Title 22 of the California Code of Regulations (CCR) are approved by EPA as a component of the federally authorized state of California RCRA program, they are considered to be a source of federal ARARs for CERCLA response actions. The exception is when a state regulation is broader in scope than the corresponding federal RCRA regulation. One example is California's designation of non-RCRA hazardous wastes. In that case, such regulations are not considered to be part of the federally authorized program or potential federal ARARs. Instead, they are state law requirements and potential state ARARs.

The mixture rule under RCRA does not apply to contaminated media such as soil, because the media has not been "discarded" and, therefore, is not a solid waste. However, under EPA's contained-in policy, media that "contains" a hazardous waste must be managed as a hazardous waste.[1]

There were no releases of listed hazardous wastes identified in the Tank Area; therefore, none of the soils would be classified as containing a listed hazardous waste. Based on the concentrations observed during previous sampling events, the following potential hazardous waste designations for the contaminated soils will be evaluated during the implementation of the removal action:

- Lead - The concentrations of total lead in the soil are high enough in some areas that the soil could potentially exceed the toxicity characteristic leaching procedure (TCLP) limit for lead of 5 milligrams per liter (mg/l). If the soils fail the TCLP for lead, they would be designated as a D008 hazardous waste. The soils could also be designated as a non-RCRA hazardous waste if the total lead concentrations exceed the total threshold limit concentration (TTLC) of 1,000 milligrams per kilogram (mg/kg), or the soils fail the soluble threshold limit concentration (STLC) of 5 mg/l for lead.

- Chromium - Though the chromium in site soil is within the range of concentrations defined as ambient, it is high enough that the soil could potentially exceed the TCLP limit for chromium of 5 mg/l. If the soils fail the TCLP for chromium, they would be designated as a D007 hazardous waste. The soils could also be designated as a non-RCRA hazardous waste if the soils fail the STLC of 5 mg/l for chromium. All of the total chromium concentrations measured at the site were below the TTLC levels.

- PCBs - One sample in the Tank Farm area exceeded the 50 mg/kg TTLC limit for PCBs, indicating that the soil in this area has the potential to be a non-RCRA PCB-containing waste. It should be noted that this concentration was not confirmed during subsequent sampling. There is no TCLP limit for PCBs.

Since most remedial technologies for addressing soil contamination eventually involve land disposal, the major impact of the designation of contaminated soils as hazardous is restrictions placed on land disposal of those soils under 22 CCR 66268. A summary of the land disposal restrictions for each of the hazardous waste codes is provided in Table 3-1. In addition, the Toxic Substances Control Act (TSCA) places treatment and disposal restrictions on PCB-contaminated soils that have concentrations greater than 50 mg/kg. These requirements are also summarized in Table 3-1.

Further discussion of the regulatory requirements triggered by specific actions that are considered as part of the removal action alternatives is provided in Section 5.

---

[1] Letter from Jonathon Z. Cannon, EPA Acting Assistant Administrator, to Thomas J. Jorling, Commissioner of New York Department of Environmental Conservation, June 19, 1989. [RCRA Compendium Number 9441.1989(30a)].

Table 3-1
Land Disposal Restrictions
Tank Farm IR-6
Hunters Point Annex

Waste Code	Restrictions
D008 (RCRA toxicity characteristic waste for lead, >5 mg/l TCLP)	Must meet treatement standard of 5 mg/l for TCLP lead.[1]
Non-RCRA lead containing waste (> 1000 mg/kg TTLC or > 5 mg/l STLC)	No additional land disposal restrictions.
D007 (RCRA toxicity characteristic waste for chromium, >5 mg/l TCLP)	Must meet treatement standard of 5 mg/l for TCLP chromium.[1]
Non-RCRA chromium containing waste (> 2500 mg/kg TTLC or > 5 mg/l STLC)	No additional land disposal restrictions.
Non-RCRA PCB containing waste (> 50 mg/kg TTLC)	Non-RCRA PCB-containing waste cannot be land disposed.[2] However, an exemption is provided for remediation waste if the cleanup is approved by a regulatory agency.[3]
TSCA PCB waste (> 50 ppm, < 500 ppm)	PCB-containing wastes greater than or equal to 50 ppm must be diposed of in an incinerator that meets the requirements of 40 CFR 761.70 or in a chemical waste landfill that complies with 40 CFR 761.75.[4]

[1] 22 CCR 66268.40
[2] 22 CCR 66268.100
[3] California Health and Safety Code, Section 25179.6 (a)(2)(B).
[4] Toxic Substances Control Act (TSCA), 40 CFR 761.

3.5 Removal Action Objectives

Based on CERCLA, the NCP, regulatory requirements, and the site-specific factors discussed so far, the removal action objectives are as follows:

- Reduce non-TPH contaminant concentrations in vadose zone soils at the site so that it can be returned to unrestricted residential use.

- Coordinate removal action activity to facilitate the start of the bioremediation pilot study in early 1996.

Based on discussions between the Navy, DTSC, the RWQCB, and EPA, it has been determined that the remedial goals for the Tank Farm will be based on a target excess cancer risk level of 10^{-6} for individual chemicals and an overall hazard index of less than unity. In the case of arsenic and beryllium, where the background concentrations exceed the target risk levels, the remedial goal is background. For PCBs, a target cleanup level of 1 ppm taken from the Superfund guidance is evaluated in addition to the lower EPA Region IX PRG concentration in order to evaluate the relative cost-benefit of remediating to the lower level. A summary of the remedial goals for the Tank Farm removal action is provided in Table 3-2.

Table 3-2
Target Cleanup Levels
Hunters Point Annex Tank Farm (IR-6)

Chemical	Target Cleanup Level	Basis
Arsenic	5.73 mg/kg	Ambient Concentration
Beryllium	0.71 mg/kg	Ambient Concentration
Lead	130 mg/kg	Cal-EPA Modified PRG
Benzo(a)anthracene	0.61 mg/kg	EPA Region IX PRG
Benzo(b)fluoranthene	0.61 mg/kg	EPA Region IX PRG
Benzo(a)pyrene	0.061 mg/kg	EPA Region IX PRG
Dibenzo(a,h)anthracene	0.061 mg/kg	EPA Region IX PRG
Aldrin	0.005 mg/kg	Soil Screening Level
PCBs	0.066 mg/kg	EPA Region IX PRG

4. Development of Removal Action Alternatives

The purpose of this section is to define the components that went into the development of the removal action alternatives. These components include: the delineation of the soils to be included in the removal, the screening of remediation technologies, and the development of the removal action alternatives.

4.1 Delineation of Removal Action Areas

As described in Section 2.3, the Tank Farm site contains both organic and inorganic contaminants. Because treatment alternatives vary for inorganic and organic compounds, the soil has been categorized into Types A and B. Figure 4-1 identifies the areas containing Types A and B soils. The estimated volumes of the two soil types are:

- Type A   2000 cubic yards
- Type B   580 cubic yards

Type A soils are located in the flat paved section of the site. Contaminants of concern contained in Type A soil include PCBs and cPAHs. Some low-level concentrations of metals have been detected in areas containing Type A soil; however, the concentrations are below the target cleanup levels and do not have the potential to cause the soil to be classified as a hazardous waste. PCBs and cPAHs were encountered at depths of up to 5 feet below grade in Area A1; therefore, Area A1 will be excavated to a depth of approximately 5 feet. In Areas A2 and A3, cPAHs were encountered in the surface samples; therefore, these areas will be excavated to approximately 2 feet below ground surface (bgs).

Type B soils include either elevated concentrations of metals or elevated concentrations of both metals and organics. Type B soil is located predominantly in the bermed areas, although there is one area in the paved section of the site that has soil designated as Type B. Area B1 soil, which contains elevated levels of lead, arsenic, beryllium, cPAHs and PCBs in the upper 2 feet of soil, will be excavated to 2 feet below grade. Area B2 and Area B4 soils, which contain elevated levels of lead in the surface soil, will be excavated to 1 foot below grade. Area B3 soil, which contains elevated levels of lead and arsenic in the surface soil, will also be excavated to 1 foot below grade. Area B5 soil, which contains elevated levels of arsenic between 1 and 2 feet below grade, will be excavated to 2 feet bgs.

4.2 Screening of Technologies

Previous project experience and available technology literature were relied upon in the evaluation of applicable technologies. The Vendor Information System for Innovative Treatment Technology (VISITT) and the Federal Superfund Innovative Technology Evaluation (SITE) databases were also used to obtain information on remediation technologies.

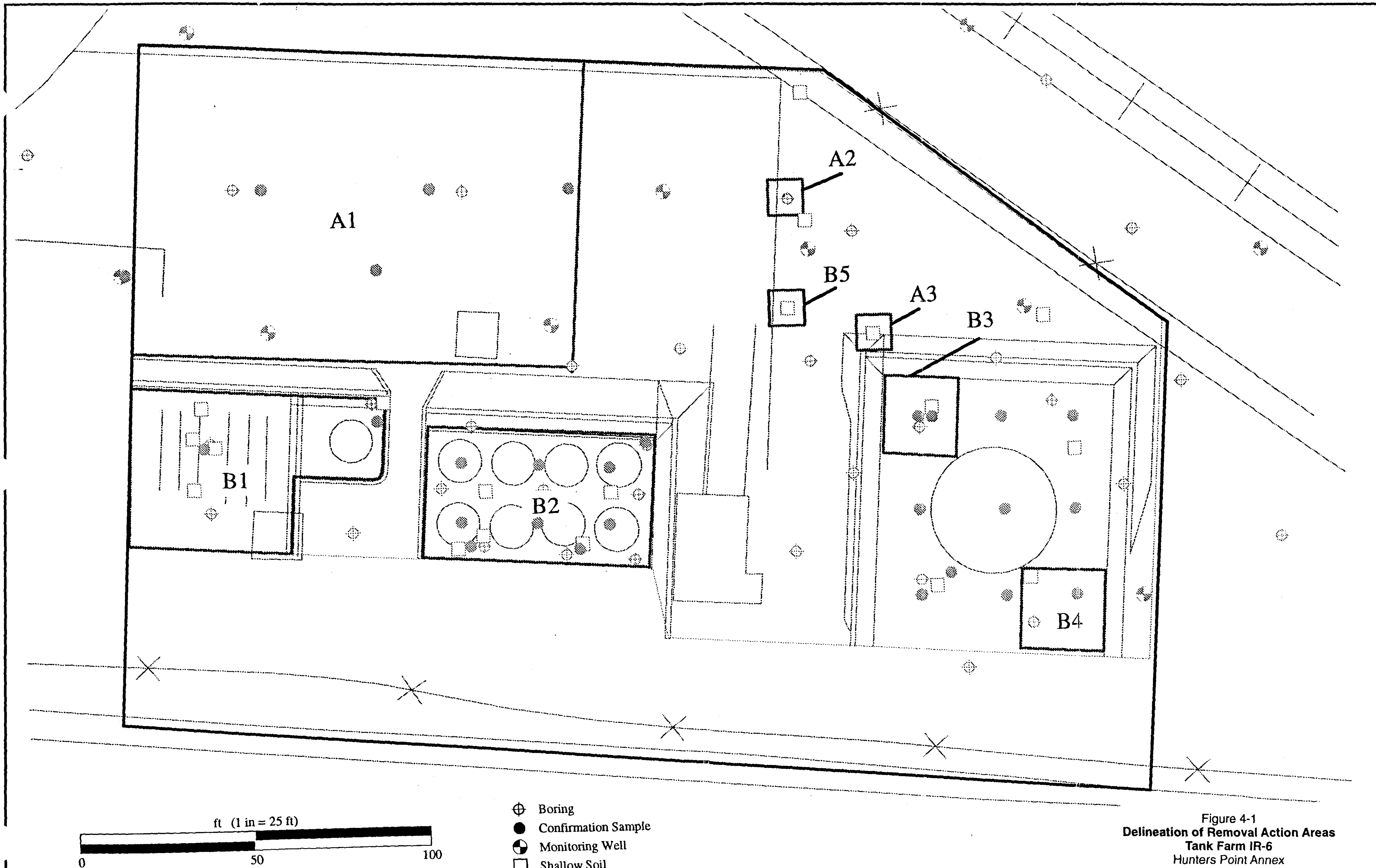


Figure 4-1
Delineation of Removal Action Areas
Tank Farm IR-6
Hunters Point Annex

102594.01.AM

CH2M HILL

Numerous remediation technologies exist for treating organic contaminated soil, including thermal treatment, biological treatment and physical/chemical treatment. For metal contaminated soil, the technologies are limited to physical/chemical treatment. Since the contamination is mixed at the Tank Farm, the metals contamination is the limiting factor in selecting a remediation technology. Thermal, biological, and chemical treatments were considered and screened for the organics contamination. Physical/chemical treatment was considered for the metals. Off-site disposal was considered for both. Table 4-1 summarizes the technology screening performed, and lists the advantages and disadvantages of each method.

In situ treatment technologies such as stabilization or solidification are not appropriate for this site since the Navy plans to sell Parcel B to the City of San Francisco. The planned future use also rules out containment actions, such as capping, and institutional controls, such as upgrading/maintenance of fences. Only ex situ treatment and disposal options are considered applicable in meeting the Navy's objective of unrestricted land use for the Tank Farm.

Excavation and disposal is an option that addresses all of the site contaminants and satisfies the remedial objectives for the site. In this scenario, soils targeted for the removal action would be excavated and stockpiled. Composite samples would be collected from these stockpiles and analyzed to determine the classification of the waste and ultimate fate of the soils. As discussed in Section 3.4.3, the classification would be one of the following:

- If concentration of PCBs is 50 mg/kg or greater, then the soils would be classified as a TSCA waste. These soils by law must be disposed of in an incinerator or a chemical waste landfill that meets TSCA requirements.

- If the concentration of one or more of the metal constituents exceeds the TCLP levels in a leaching test, the soils would be classified as a RCRA hazardous waste. The soils would have to be disposed of at a Class I landfill where they would be treated (stabilized) to meet LDR treatment standards.

- If the concentration of one or more of the organic and metal constituents exceeds TTLC levels or the STLC levels in a leaching test, the soils would be classified as a California hazardous waste. The soils would have to be disposed of at a Class I landfill where they would be treated (stabilized) to meet LDR treatment standards.

- If the concentrations of all organic and metal constituents are below TTLC levels and are also below TCLP and STLC levels in a leaching test, then the soils would not be classified as a hazardous waste. These soils could be shipped to a Class II landfill.

Based on existing data, it is not anticipated that the excavated soils would be classified as a TSCA waste. Of the samples analyzed for PCBs, only one has a concentration above 50 mg/kg (reported as 150 mg/kg, but with a laboratory qualifying flag). During the confirmation sampling performed by CH2M HILL, a concentration of only 1.2 mg/kg was detected in that location. The other nine PCB detections at the site ranged in concentration from 0.077 mg/kg to 4.9 mg/kg. Therefore, disposal options for TSCA waste are not evaluated further in this EE/CA. Upon excavation and stockpiling, composite samples from the Type A soil stockpile will be analyzed for PCBs. If the composite samples indicate

Table 4-1
Comparison of Treatment and Disposal Methods
Tank Farm IR-6
Hunter's Point Annex

Method	Advantages	Disadvantages
Thermal Treatment		
- Incineration	Complete destruction of organic contaminants	Not available in California Metals not treated Very expensive
- Thermal Desorption	Can perform on-site Very effective for organics with low molecular weights; less effective for organics with high molecular weights Destruction of organic contaminants	Metals not treated Expensive
Biotreatment	Fairly effective for PAHs with low molecular weights Destruction of organic contaminants	Not effective for PAHs with high molecular weights Metals not treated Not a proven technology for PCBs Expensive
Physical/Chemical Treatment		
- Soil Washing	Can be used to remove both organics and metals given different washing solutions	Not effective in fine grained soil Transfers waste from solid to liquid Not necessarily effective treatment
Landfill	Applicable for all contaminant types[a] Relatively inexpensive for Class II landfills	Expensive for Class I landfills Waste is not destroyed

[a]At anticipated contaminant concentrations

the presence of PCB concentrations greater than 50 ppm, an amendment to this EE/CA may need to be produced, and incineration will be analyzed at that time.

4.3 Development of Alternatives

Based on the technology screening discussed in Section 4.2, the options for treating Tank Farm soils were limited to thermal treatment, which is only effective for the remediation of organics. Because metals cannot be thermally treated, this option is only applicable for Area A soils, and is contingent upon metals in that zone passing TTLC levels as well as TCLP and STLC leaching levels.

Two disposal scenarios are carried forward into alternatives. Soils from Areas A and B may have to be pretreated and disposed of at a Class I landfill if the contaminants exceed TTLC, TCLP, or STLC levels. If all the contaminants are below these levels, then the soils may be disposed of at a Class II landfill.

Based on the results of the technology screening, the following alternatives have been developed:

1. No Further Action

2. Excavation (Areas A and B):

    - (a) Pretreatment/Disposal at a Class I Landfill

    - (b) Disposal at a Class II Landfill

3. Excavation, Thermal Treatment, and Replacement (Area A); Excavation (Area B):

    - (a) Pretreatment/Disposal at a Class I Landfill

    - (b) Disposal at a Class II Landfill

Section 5 describes the alternatives and provides information related to their effectiveness, implementability, and costs.

5. Evaluation of Removal Action Alternatives

As described in Section 4, three alternatives have been developed for the removal action at the Tank Farm. These alternatives are described in the following sections and are evaluated based on effectiveness, implementability, and cost. For comparison, the No Action alternative is included as required under the NCP. Table 5-1 presents the action-specific ARARs for the removal action alternatives.

To evaluate the effectiveness of each alternative, consideration was given to the overall protection of human health and the environment, compliance with ARARs and other guidance, and both the long- and short-term effectiveness of the alternative. Evaluation of the implementability of each alternative included consideration of the technical feasibility, commercial availability, administrative feasibility, and public acceptance.

The cost evaluation was based upon estimates for capital costs and annual operations and maintenance costs. Capital costs include the costs for design, construction, equipment, mobilization and rental, labor, analytical costs, transportation, and disposal fees. It is assumed that all activities associated with the removal action will occur within one year, and that operations and maintenance costs are built into the capital costs. For this analysis, it has been assumed that all operations will be conducted by Navy PWC employees. Copies of the cost estimates are included in the Appendix.

5.1 Alternative 1 - No Action

The CERCLA-required baseline for comparison involves taking no further action to treat, contain, or remove any of the contaminated soil. This alternative does not meet the removal action objective of returning the Tank Farm to unrestricted land use. While there is no cost associated with No Further Action, the alternative is not implementable. It would not be acceptable to regulatory agencies or to the local community.

5.2 Alternative 2 - Excavation and Disposal

5.2.1 Description

Alternative 2(a) assumes that Type A and Type B soils identified for removal would be classified as either a RCRA hazardous waste or as a California hazardous waste. The soil would be excavated, stockpiled, and analyzed for total lead and total PCBs, as well as TCLP and STLC lead and chromium. If the soil is confirmed to be a hazardous waste, it would be disposed of at a Class I facility.

Alternative 2(b) is the same as above except that it assumes that the soil would not be classified as a hazardous waste and could be disposed of at a Class II facility. The soil would not require any pretreatment prior to disposal.

Table 5-1 Action-Specific ARARs Tank Farm IR-6 Hunters Point Annex	
Action	**Requirements**
Excavation	• Bay Area Air Quality Management District (BAAQMD) Rule 6-305 (Visible Particles) prohibits the emission of visible particles from any operation in sufficient number to cause annoyance to any other person. This rule only applies if the particles fall on real property of other than that of the person responsible for the emission. Dust control measures may need to be implemented during excavation if these conditions exist.
Management of soils in waste piles	• If soils are to be managed in waste piles after excavation and prior to treatment or disposal, the substantive RCRA requirements for waste piles may be applicable (if the soil is a hazardous waste) or relevant and appropriate (if there are hazardous constituents present). These include 22 CCR 66264.251 (design and operating requirements), 66264.252 (action leakage rate), 66264.254 (monitoring and inspection), and 66264.258 (closure and post-closure care).

Ex-situ thermal desorption with afterburner	• Substantive portions of the RCRA hazardous waste treatment facility requirements may be applicable for the treatment unit if the soils are determined to be a hazardous waste. Less stringent treatment unit standards may be approved by the implementing agency (DTSC) under the CAMU provisions of 22 CCR 66264.553 or under the temporary treatment unit provisions of 22 CCR 264.554.
	• Off-gas treatment would need to meet the substantive portions of the following BAAQMD requirements:
	  • Rule 2-2-301. Best available control technology would be required unless it is demonstrated that the exemptions in Rule 2-2-111 are met.
	  • Rule 6-310. Particulate emissions are limited to 343 mg per dscm (0.15 gr. per dscf) of exhaust gas volume.
	  • Rule 8-2-301. Organic compound emissions are limited to 6.8 kg (15 lbs) per day and containing a concentration no more than 300 ppm carbon on a dry basis.
	  • Rule 11-1-301. Lead emissions are limited to 6.75 kg (15 lbs) per day.
	  • Rules 11-1-302, 303. Ground level air concentration emissions are limited to 1.0 ug/m^3 over a 24 hour period or an average of 1.0 ug/m^3 above background averaged over a 30 day period.

On-site placement of treated soil	• Characteristic hazardous waste that is treated to the LDR standard can be placed onsite provided that it also meets the site cleanup standards.
Off-site disposal at non-RCRA facility (Class II)	• Characteristic hazardous waste that is treated to the LDR standard can be disposed at a non-RCRA (Class II or Class III) landfill since the material would no longer be considered to be a hazardous waste.
Off-site disposal at RCRA facility (Class I)	• LDR notification requirements at 22 CCR 66268.7 must be met for hazardous waste sent off-site for treatment and disposal.
Hazardous Materials Transportation	• Requirements for the transportation of hazardous materials are found at 40 CFR 171. Substantive portions of these requirements would be ARARs for transport of materials onsite. Off-site transport must comply with both the substantive and administrative requirements.

5.2.2 Effectiveness

Alternatives 2(a) and 2(b) provide the same level of effectiveness.

- Long-term effectiveness, permanence, and protection of public health and the environment are provided.
- Compliance with ARARs and TBCs is achieved.
- Short-term exposure to contaminants may be increased during excavation activities, and this would have to be mitigated.
- Alternatives do not satisfy CERCLA preference for treatment over disposal. Alternative 2(a) would provide stabilization pretreatment of toxicity characteristic metals.
- Alternatives provide the highest degree of certainty.
- Removal action objective of returning the land to unrestricted use would be met.

5.2.3 Implementability

Both alternatives 2(a) and 2(b) have the same level of implementability.

- Alternatives are technically and administratively feasible.
- Services and materials are available. Standard construction equipment will be used for the excavation and materials handling. Off-site treatment and landfill capacity are available.
- EPA, DTSC, and RWQCB acceptance is expected.
- No community concerns with this remedy are anticipated.

5.2.4 Cost

Estimated Cost for Alternative 2(a): $1,184,820

Estimated Cost for Alternative 2(b): $379,320

5.3 Alternative 3 - Excavation, Thermal Treatment, and Disposal

5.3.1 Description

Alternative 3(a) involves excavation of organics-contaminated soil in Area A and of metals-contaminated soil in Area B. Soils from each area would be stockpiled separately. Soils from Area A would be treated in a thermal desorption unit to destroy the organics and then placed back onsite. Area B soils would be stabilized and disposed of in a Class I hazardous waste landfill. This alternative assumes that Area B soil would be classified as either a RCRA hazardous waste or as a California hazardous waste.

Alternative 3(b) is the same as above except that it assumes that Area B soil would not be classified as a hazardous waste and could be disposed of at a Class II facility. The soil would not require any pretreatment prior to disposal.

5.3.2 Effectiveness

Alternatives 3(a) and 3(b) provide the same level of effectiveness.

- Long-term effectiveness, permanence and protection of public health and the environment may be provided.
- Compliance with ARARs and TBCs may be achieved.
- Alternatives do satisfy CERCLA preference for treatment over disposal. Alternative 3(a) would provide stabilization pretreatment of toxicity characteristic metals.
- Toxicity and mobility of organic contaminants would potentially be reduced through thermal treatment. If destruction is not complete, chlorinated compounds that are more mobile could be formed.
- Short-term exposure to contaminants may be increased during excavation activities and during treatment operations.
- There is less certainty involved with this alternative. Because thermal treatment may not be successful in meeting the target cleanup levels for PCBs and cPAHs, it is possible that some or all of the thermally treated soils would still require off-site disposal at a Class II facility.
- Removal action objectives of returning the land to unrestricted use would be met.

5.3.3 Implementability

Both alternatives 3(a) and 3(b) have the same level of implementability.

- These alternatives are technically feasible. The presence of clay could pose some difficulty in the soils preparation required for thermal treatment and lower the effectiveness of the treatment.
- This alternative may not be administratively feasible. Air emission regulations would have to be met. If lead levels exceed the TCLP thresholds, the thermal unit may be classified as a hazardous waste treatment unit.
- Services and materials are available. Standard construction equipment is used for the excavation and materials handling. Commercial units are available for the thermal desorption. Off-site treatment and disposal capacity for Type B soil is available.
- Regulatory acceptance would be contingent on the treatment complying with RCRA and Bay Area Air Quality Management District (BAAQMD) regulations.
- There are potential community concerns related to operations of the thermal unit.

5.3.4 Cost

Estimated Cost for Alternative 3(a): $1,136,940

Estimated Cost for Alternative 3(b): $987,380

6. Comparative Analysis of Removal Action Alternatives

In this section, the alternatives analyzed in Section 5 are compared in order to evaluate their relative performance in relation to the criteria. The criteria used in this comparison are the same as in Section 5: effectiveness, implementability, and cost.

6.1 Effectiveness of Alternatives

The remedial objectives of the removal action are to remove the non-TPH contaminants that are above the target cleanup levels. Alternative 2, complete excavation and disposal, is the most effective alternative and has the most certainty of effectiveness. While Alternative 3, thermal desorption, can be effective at treating PCBs, cPAHs, and TPH, there is less certainty regarding the effectiveness of the treatment. Additionally, there is an ultimate treatment efficiency; therefore, total removal of the contamination is not achieved. The least effective alternative is Alternative 1, which does not meet the remedial objectives for the site.

In summary, the effectiveness ranking of the alternatives is:

1. Alternative 2(a/b)
2. Alternative 3(a/b)
3. Alternative 1

6.2 Implementability of Alternatives

The EPA has stated a preference for treatment over disposal whenever possible. For this reason, Alternative 3(a/b) would score higher than Alternative 2, if not for regulatory and community acceptance concerns related to thermal treatment of PCBs. Incomplete combustion products, potential production of dioxins and furans, and air emissions in general are all issues that are of concern for this technology. In addition, if the lead contamination is above TCLP or STLC thresholds, then the thermal unit would be considered a hazardous waste treatment unit and would require further administrative permitting. Community acceptance may also be more difficult to obtain for Alternative 3 than for Alternative 2 since thermal treatment has a negative public perception. For these reasons, Alternative 3 does not score as well as Alternative 2. The most certain and the most readily implementable alternative is excavation with off-site disposal.

In summary, the implementability ranking of the alternatives is:

1. Alternative 2(a/b)
2. Alternative 3(a/b)
3. Alternative 1

6.3 Cost of Alternatives

The No Further Action alternative does not incur any costs. Alternative 2(b), the off-site disposal of non-hazardous waste is the cheapest acceptable alternative. The thermal desorption alternatives 3(a) and 3(b) scored higher than Alternative 2(a), although all three costs are approximately the same. However, the level of certainty is far lower for Alternative 3. If the thermal treatment does not reach the target cleanup levels for the PCBs and PAHs, the soils could not be backfilled onsite as assumed. In that case, Alternative 2 costs would have to be added to Alternative 3 costs since the soil would require off-site disposal after the thermal treatment. Conservatively, Alternative 3 costs could double in that scenario.

In summary, the cost ranking of the alternatives is:

1. Alternative 1
2. Alternative 2(b)
3. Alternative 3(b)
4. Alternative 3(a)
5. Alternative 2(a)

7. Recommended Removal Action Alternative

The EE/CA was performed in accordance with current EPA and U.S. Navy guidance documents for a non-time critical removal action under CERCLA. The purpose of this EE/CA is to identify and analyze alternative removal actions for the Tank Farm site. Three alternatives were identified, evaluated, and ranked. These alternatives include: (1) No Further Action, (2) Excavation and Disposal, and (3) Excavation, Thermal Treatment, and Disposal.

Based on the comparative analyses of the removal action alternatives completed in Section 5, the recommended removal action is Alternative 2, Excavation and Disposal. The Alternative has moderate to high cost, but is readily implementable and has the highest effectiveness. Alternative 2 also has the lowest cost if the soils are not classified as a RCRA or a California hazardous waste. There is a high degree of certainty associated with this alternative.

8. References

40 CFR Part 300. 1990. National Oil and Hazardous Substances Pollution Contingency Plan. U. S. Code of Federal Regulations.

40 CFR Parts 300-375. 1993. Superfund, Emergency Planning, and Community Right-To-Know Programs. U. S. Code of Federal Regulations.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Public Law 96-510

DA (San Francisco District Attorney's Office), 1986. *People of California v. Triple A Machine Shop Inc., et al., Exhibit to Temporary Restraining Order Construction Trust, and Appointment of Receiver filed by Arlo Smith, District Attorney, et al., in the Superior Court of the State of California, in and of the City and County of San Francisco.*

EMCON Associates, 1987. *Confirmation Study Verification Step, Hunters Point Naval Shipyard (Disestablished), San Francisco, California.* Volumes I and II. March 19.

EPA (Environmental Protection Agency), 1988. *CERCLA Compliance with Other Laws Manual: Interim Final.* EPA/540/G-89/006.

__________, 1988. *Superfund Removal Procedures.* OSWER Directive 9360.0-03B. February.

__________, 1991. *CERCLA Compliance with Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements.* EPA/540/G-89/009.

__________, 1991. *Superfund Removal Procedures: Guidance on the Consideration of ARARs During Removal Actions.* EPA/540/P-91/011.

__________, 1992. *Community Relations in Superfund: A Handbook.* OERR Directive 9230.0-03C.

__________, 1992. *Superfund Removal Procedures: Public Participation Guidance for On-Scene Coordinators - Community Relations and the Administrative Record.* OERR Publication 9360.3-05.

__________, 1993. *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA.* OSWER Publication 9360.0-32.

HLA, 1988. *Tank Sampling Investigation, Tank Farm, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* October 19.

__________, 1989. *Community Relations Plan, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* December.

__________, 1990. *Removal Action for Tank Farm (IR-6) Volume I - Work Plan, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* December.

__________, 1992a. *Technical Memorandum, Operable Unit V Redefinition, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* April 10.

__________, 1992b. *Draft Operable Unit II Feasibility Study Report, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* June 12.

__________, 1993a. *Draft Operable Unit II Summary Alternative Selection Report, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* February 8.

__________, 1993b. *Draft Final Operable Unit II Summary Alternative Selection Report, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* May 14

__________, 1993c. *Draft Construction Summary Report, Tank Farm Removal Action, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California.* October 22.

PRC Environmental Management Inc., 1992. *Tank Contents Sampling and Analysis, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California. Draft.* August 3.

United States Department of the Navy, 1992. *Navy/Marine Corps Installation Restoration Manual.*

United States Department of the Navy, Environmental Field Activity West, 1995. Ambient Levels at Hunters Point Annex.

WESTEC Services, Inc., 1984. *Initial Assessment Study, Hunters Point Naval Shipyard (Disestablished), San Francisco, California.* October.

Appendix

Cost Tables

Hunter's Point Annex Feasibility Study
Cost Assumptions and Sources
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 9, 1995

Notes	Assumptions and Sources
a	Excavation costs provided by Navy Public Works and accounts for equipment rental, excavation and loading. Soil density assumed to be 1.55 TN/CY. Backfilling costs based on Means Construction Cost Data 1995 Adjusted and includes compaction, recontouring and grading. Backfill volume is assumed in-place. *Assumed that berm areas are not backfilled since underlying soils will be excavated* as part of the bioremediation pilot study. Field Management is assumed to be Navy Public Works foreman.
b	Transportation and Disposal costs to a Class I landfill provided by Navy Public Works per contract with Laidlaw for $180/ton. Includes any pretreatment required before disposal.
c	Transportation and Disposal costs to a Class II landfill provided by Forward landfill and assumes $15/ton transportation and $20/ton for disposal.
d	Analytical costs based on quote from QAL laboratory and includes lead, PCBs, cPAHs results. CH2M HILL labor assumed to be 2 people, $40/hr, for 10 days each.
e	Well abandonment and well installation costs based on engineering estimate. Includes any necessary permitting.
f	Thermal desorption costs based on engineering estimate. Assumes *indirect fired thermal unit* is required for PCBs. Mobilization costs are based on engineering estimate, incorporating other Inorganic contaminants require offsite disposal after treatment. Assumed 500 tons

Hunter's Point Annex Feasibility Study
Alternative 1: No Action
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$0	
No Action Required			$0		
B) Groundwater Monitoring				$0	
No New Groundwater Monitoring Well			$0		
CONSTRUCTION COST SUBTOTAL				$0	
Mobilization & Gen'l Reqm'ts @ 5%				$0	
CONSTRUCTION COST SUBTOTAL				$0	
Contingencies					
Scope Contingency @ 25%				$0	
				$0	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$0	
IMPLEMENTATION COST TOTAL				$0	
Engineering/Design @ 5%				$0	
CAPITAL COST TOTAL				$0	
ANNUAL OPERATIONS & MAINTENANCE COST					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
Estimated Capital Cost (from above)				$0	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 2A: Excavation and Disposal in Class I Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$779,920	
Excavation and Loading	3,840 TN	$8	$30,720		a
Trans/Disposal Costs to Class I Landfill	3,840 TN	$180	$691,200		b
Purchase/Compact Backfill	2,000 CY	$20	$40,000		a
Field Management	6 WK	$3,000	$18,000		a
B) Confirmation Sampling				$21,000	
CH2M HILL Labor	1 LS	$6,400	$6,400		d
Analytical Costs	1 LS	$14,600	$14,600		d
C) Groundwater Monitoring				$18,000	
Well Abandonment	4 WELLS	$1,000	$4,000		e
Well Installation	4 WELLS	$3,500	$14,000		e
CONSTRUCTION COST SUBTOTAL				$818,920	
Mobilization & Gen'l Reqm'ts @ 5%				$40,900	
CONSTRUCTION COST SUBTOTAL				$859,820	
Contingencies					
Scope Contingency @ 25%				$215,000	
				$1,074,820	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$54,000	
IMPLEMENTATION COST TOTAL				$1,128,820	
Engineering/Design @ 5%				$56,000	
CAPITAL COST TOTAL				$1,184,820	
ANNUAL OPERATIONS & MAINTENANCE COST (30 Years Total Duration)					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
TOTAL ALTERNATIVE COST				$1,184,820	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 2B: Excavation and Disposal in Class II Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$223,120	
Excavation and Loading	3,840 TN	$8	$30,720		a
Trans/Disposal Costs to Class II Landfill	3,840 TN	$35	$134,400		c
Purchase/Compact Backfill	2,000 CY	$20	$40,000		a
Field Management	6 WK	$3,000	$18,000		a
B) Confirmation Sampling				$21,000	
CH2M HILL Labor	1 LS	$6,400	$6,400		d
Analytical Costs	1 LS	$14,600	$14,600		d
C) Groundwater Monitoring				$18,000	
Well Abandonment	4 WELLS	$1,000	$4,000		e
Well Installation	4 WELLS	$3,500	$14,000		e
CONSTRUCTION COST SUBTOTAL				$262,120	
Mobilization & Gen'l Reqm'ts @ 5%				$13,100	
CONSTRUCTION COST SUBTOTAL				$275,220	
Contingencies					
Scope Contingency @ 25%				$69,000	
				$344,220	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$17,000	
IMPLEMENTATION COST TOTAL				$361,220	
Engineering/Design @ 5%				$18,100	
CAPITAL COST TOTAL				$379,320	
ANNUAL OPERATIONS & MAINTENANCE COST					
A) *Soil Remediation--No Cost*				$0	
B) Groundwater Monitoring--No Cost				$0	
TOTAL ALTERNATIVE COST				$379,320	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 3A: Thermal Desorption with Excavation and Disposal in Class I Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$746,500	
Excavation and Loading	3,100 TN	$8	$24,800		a
Thermal Desorption Treatment	3,100 TN	$175	$542,500		f
Backfill Treated Soil	2,000 CY	$5	$10,000		a
Trans/Disposal Costs to Class II Landfill	740 TN	$180	$133,200		a
Field Management	12 WK	$3,000	$36,000		b
B) Confirmation Sampling				$21,000	
CH2M HILL Labor	1 LS	$6,400	$6,400		c
Analytical Costs	1 LS	$14,600	$14,600		c
C) Groundwater Monitoring				$18,000	
Well Abandonment	4 WELLS	$1,000	$4,000		d
Well Installation	4 WELLS	$3,500	$14,000		d
CONSTRUCTION COST SUBTOTAL				$785,500	
Mobilization & Gen'l Reqm'ts @ 5%				$39,300	
CONSTRUCTION COST SUBTOTAL				$824,800	
Contingencies					
Scope Contingency @ 25%				$206,000	
				$1,030,800	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$52,000	
IMPLEMENTATION COST TOTAL				$1,082,800	
Engineering/Design @ 5%				$54,140	
CAPITAL COST TOTAL				$1,136,940	
***ANNUAL OPERATIONS & MAINTENANCE COST* (30 Years Total Duration)**					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
TOTAL ALTERNATIVE COST				$1,136,940	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 3B: Thermal Desorption with Excavation and Disposal in Class II Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$643,280	
Excavation and Loading	3,610 TN	$8	$28,880		a
Thermal Desorption Treatment	3,100 TN	$175	$542,500		f
Backfill Treated Soil	2,000 CY	$5	$10,000		a
Trans/Disposal Costs to Class II Landfill	740 TN	$35	$25,900		c
Field Management	12 WK	$3,000	$36,000		a
B) Confirmation Sampling				$21,000	
CH2M HILL Labor	1 LS	$6,400	$6,400		d
Analytical Costs	1 LS	$14,600	$14,600		d
C) Groundwater Monitoring				$18,000	
Well Abandonment	4 WELLS	$1,000	$4,000		e
Well Installation	4 WELLS	$3,500	$14,000		e
CONSTRUCTION COST SUBTOTAL				$682,280	
Mobilization & Gen'l Reqm'ts @ 5%				$34,100	
CONSTRUCTION COST SUBTOTAL				$716,380	
Contingencies					
Scope Contingency @ 25%				$179,000	
				$895,380	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$45,000	
IMPLEMENTATION COST TOTAL				$940,380	
Engineering/Design @ 5%				$47,000	
CAPITAL COST TOTAL				$987,380	
ANNUAL OPERATIONS & MAINTENANCE COST					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
TOTAL ALTERNATIVE COST				$987,380	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

RESPONSE TO AGENCY COMMENTS ON THE DRAFT ENGINEERING EVALUATION AND COST ANALYSIS REPORT FOR A REMOVAL ACTION AT THE IR-6 TANK FARM

This document presents the U.S. Department of the Navy's (Navy) responses to comments from the regulatory agencies that reviewed the draft engineering evaluation and cost analysis (EE/CA) report for a removal action at the IR-6 Tank Farm at Hunters Point Annex (HPA). The comments addressed below were received from the California Department of Toxic Substances Control (DTSC) on January 9, 1996, and from the U.S. Environmental Protection Agency (EPA) on January 8, 1996. EPA comments are addressed first followed by DTSC general and specific comments.

EPA Comments

General Comments

1. *Figure 4-1 presents the proposed areas in the Tank Farm to be excavated. There are several sample points that have metal concentrations above target cleanup levels that are not within the proposed excavations... (examples: SS09, SS19, BO26, BO24, & SS12)*

   Samples BO24, BO26, and SS19 contain levels of beryllium above the target cleanup levels. These samples should have been included in the excavation plan. Samples SS09 and SS12 indicated high levels of lead. CH2M HILL collected confirmation samples at these locations and detected much lower levels of lead. Because the Draft Construction Summary Report, Tank Farm Removal Action (HLA, 1993) indicated that soil had been removed in this area during the tank removal, we believe that the confirmation samples better reflect the current soil conditions. Therefore, we did not include these sample locations in the excavation plan. A revised Figure 4-1, which indicates the current excavation plan, is attached.

2. *Are the estimated depths of the contamination accurate? Were sufficient deeper soil samples analyzed to allow for an accurate estimate of the depth of contamination?... (example BO39)*

   We based the depths of excavation on HLA's data. We plan to excavate to approximately 5 feet below the existing soil surface (not ground surface as stated in the report - there is approximately 6 inches of concrete in Area A1). Although there is limited information on the vertical extent of contamination, we have chosen this average depth to approximate the amount of soil that will require treatment or disposal. We realize that in some areas, the excavation will likely be slightly deeper; however, other areas of the excavation will also be slightly shallower. We will determine if the vertical extent of contamination is adequate by performing confirmation sampling. This sampling will occur on a 25-foot grid throughout the excavation area. If confirmation sampling indicates that target cleanup levels have not been met, further excavation and confirmation sampling will be performed. A updated Section 4.1, which presents revised information regarding the removal action areas, is attached.

3. *The discussion on pretreatment of hazardous soils prior to disposal at the Class I landfill is not presented in detail. Please specify where pretreatment will be performed. What was the basis for the estimated disposal costs?*

   Pretreatment of hazardous material, if necessary, will be performed at the landfill. The estimate of disposal costs was based on an existing contract between Navy PWC and Laidlaw. Please refer to the Appendix: Cost Assumptions and Sources Table.

4. *The cost estimates for Alternatives 2 and 3 include installation and abandonment of four monitoring wells, but the text does not include justification for the wells. Please discuss the purpose of the wells. Are the wells to monitor the management of soils in waste piles after excavation?*

   The four wells referenced in the cost estimates are existing wells within the planned excavation area that we believed were currently part of a monitoring program. Based on additional information provided by the Navy, it appears that three of these wells may not be part of an active monitoring program; however, additional wells may be affected by the removal action. We will abandon all wells within the proposed excavation area prior to the commencement of excavation activities; we will install replacement wells for only those wells that are currently part of a monitoring program.

5. *The objectives of the removal action need to be stated in more detail rather than just the objectives of the EE/CA document. Further, the Navy must explain how this removal action fits into the overall cleanup strategy for the site. (i.e. final remedial action).*

   The objectives of this removal action are to reduce the overall threat to human health and the environment posed by non-TPH contaminants in the soil at IR-6. These contaminants, which include PCBs, cPAHs, lead, arsenic, beryllium, and manganese, are present at levels above the target cleanup levels (TCLs). The TCLs were determined based on the ambient metal concentrations in the soil and/or the EPA Region IX PRGs for metals and cPAHs. This removal action fits into the overall cleanup strategy that the Navy has for the parcel, since it removes potential sources of high risk and carcinogenic compounds, thereby reducing the threat to groundwater and minimizing future human exposure to contaminated surface soil. The groundwater and remaining soil contamination will be addressed in the Parcel B ROD.

Specific Comments

1. *Section 2.1.2, first paragraph. Please discuss the locations of Triple A's illegal waste discharge. Include a discussion of whether the Tank Farm is a known or suspected source of illegal discharge.*

   The District Attorney reported that Triple A Machine Shop was charged with illegally disposing hazardous waste at several location at HPA including the Tank Farm. In 1992 Triple A was convicted on five counts of illegal disposal, though it is not known whether the alleged Tank Farm discharge was one of the counts. The exact locations of confirmed illegal discharges are not known at this time. Litigation by the Navy against Triple A is still proceeding.

2. *Section 2.2.1, p. 2-6, last paragraph. This section says tanks 1-8 were sampled but no discussion of tank 2 is included. Tank 9 is discussed instead. Please clarify.*

   Tank 2 was left off the list of sampled tanks in the second sentence of this paragraph. However, in the last sentence on the page, the contents of Tank 2 are discussed.

3. *Section 2.2.2, last paragraph. This paragraph states that 140 cubic yards were excavated from the bermed areas and disposed of in 1933. Please delineate the previously excavated areas on a figure. Cite the specific report reference.*

   No figures are available delineating the excavation areas. The information presented was obtained from the Draft Construction Summary Report, Tank Farm Removal Action (HLA, 1993).

4. *Figure 2-4. This figure does not show the location of sample CF-13. This sample was taken to confirm PCB contamination and should be included on the figure.*

   The figure does show the location of CF-13. It was collected in the same area as CF-2, but at a depth of 5 feet below ground surface.

5. *Section 2.3. It is not clear whether the data discussed in this section includes both HLA data and CH2M HILL data or solely CH2M HILL data. The first paragraph on p. 2-10 says no PAHs were detected, yet the second paragraph on p. 2-10 says they are a primary contaminant. The third paragraph of this section indicates metals are a problem, yet the first paragraph on p. 2-10 indicates no metals were analyzed in the most recent sampling. Please specify which data set is being used to determine nature and extent for each part of the discussion.*

   The first paragraph on p. 2-10 is part of Section 2.2.3 which discusses the results of CH2M HILL's confirmation sampling. No cPAHs were detected by CH2M HILL. The first sentence on p.2-10 also states that the confirmation samples were analyzed for lead as well as PCBs, cPAHs and/or pesticides. At the time the samples were collected, it was our understanding that lead was the only metal of concern. Although other metals are above ambient levels, only beryllium, lead, and arsenic are present in concentrations above the target cleanup levels.

   As stated in the last paragraph of Section 2.3 (p. 2-14), the evaluation of the nature and extent of contamination was based primarily on the results of HLA's RI investigation. This data was chosen because it was much more extensive than CH2M HILL's confirmation sampling. However, it should have also been stated that in the bermed areas for the 210,000-gallon diesel tank and the 8 12,000-gallon tanks, CH2M HILL's data was used because it is our understanding that soil was removed from these areas subsequent to HLA's RI investigation. To confirm soil removal in these locations, CH2M HILL collected confirmation samples in a grid pattern. Our confirmation sampling indicated that it was likely that some soil had been removed (lead concentrations were consistently lower than previously detected); therefore, we feel that CH2M HILL's confirmation sampling results better reflect the soil conditions in these areas.

6. *Section 2.3, third paragraph, p. 2-10. The EE/CA for Exploratory excavation Sites (PRC, 1995) provides a list (Table 2) of background metals levels that have been approved by the regulatory agencies. Table 2-2 of this EE/CA has background levels that are different. The values should be the same...*

   At the time this EE/CA was being prepared, the ambient levels had not yet been finalized. The updated Table 2-2 and Figures 2-5, and 4-1 are also attached. In addition, a revised Section 2.3 Nature and Extent of Contamination section is attached.

7. *Figure 2-6. Provide a legend for the symbols used on this figure. In particular, depth should be noted.*

   A legend is provided for the symbols used on this figure. The depth is noted in the text box attached to each sampling location.

8. *Section 3.5, last paragraph, third sentence. Provide more details on the relative cost-benefit evaluation for the two PCB cleanup levels.*

   Because the extent of contamination is not well defined in the concrete covered portion of the site (Area A) and because the concentrations of PCBs and/or cPAH above target cleanup levels were spread throughout the borings in the area, we took a conservative approach to defining the removal action boundaries for Area A. Based on this approach, we felt that it would not significantly increase the costs to remove to 0.066 ppm instead of 1 ppm. In addition, 0.066 ppm is being used as a cleanup level elsewhere at HPA.

9. *Section 4.2, second paragraph. Explain why stabilization or solidification are not appropriate if the Navy plans to sell Parcel B to the City of San Francisco. Other EE/CAs have not used this as a limitation... This inconsistency should be resolved and the EE/CAs revised accordingly.*

   We agree that in-situ stabilization/solidification is a technically feasible alternative. CH2M HILL did not carry it through the alternative evaluation because we did not believe that it is an economically feasible or practical alternative for just the Tank Farm Site. Some concerns we had regarding in-situ stabilization/solidification include:

   - Stabilized material may not be appropriate for use as backfill material if the City has to excavate and recompact in order to provide a suitable foundation for residential development.

   - The complex mixture of constituents present at the site include PCBs, lead, cPAHs and TPH-diesel. A mix design that is appropriate for one or more of these constituents may not be appropriate for all of the constituents. For example, if TPH-diesel, which is not a constituent of concern for this removal action, is not addressed by the stabilization, the stabilized materials may require further treatment before the City can use the area for residential development (which is our understanding of the current plan).

   - A relatively small volume of soil will be excavated from the Tank Farm. The in-situ stabilization technology has high mobilization and demobilization costs, in addition to the costs associated with bench-scale treatability and full-scale demonstration testing. Although the technology is more cost effective for larger volumes of material (e.g. as part of a larger parcel wide EE/CA), at the time the EE/CA was written, we were not aware that this technology was being considered for other sites.

It was our understanding that the Navy, as well as the agencies, would like this removal action to be complete by the spring of 1996. Although we agree that in-situ stabilization/solidification may be appropriate if it is used at the Tank Farm in combination with other sites, we have some concerns regarding the potential impacts using this technology would have on the schedule for the Tank Farm removal action and bioremediation pilot study.

10. *Section 5.0. These alternatives need more description. In particular, include a discussion of the types of soil to be treated with each technology. Also specify the analytes and extent of confirmatory sampling.*

The first paragraph in Section 5.0 should state the following: As presented in Section 4.3, three alternatives have been developed for the removal action at IR-6. These are

1. No Further Action,
2. Excavation and Disposal of Type A and Type B soils, and
3. Excavation, Thermal Treatment (Type A soils) and Disposal (Type B soils).

Alternatives 2 and 3 each have two scenarios, one being Class I hazardous waste and the other being Class II waste. The constituents of concern in Area A are predominantly organics (PCBs and cPAHs); Area B soils are contaminated predominantly with metals, but also contain PCBs and cPAHs in some areas. Confirmation sampling will be performed on a 25-foot grid and will include the constituents of concern identified for the area. Please refer to the revised Section 2.3 for additional information on the constituents of concern for each area.

11. *Section 5.1. State that the No Action alternative also does not protect human health and the environment.*

Section 5.1 should be amended to include this statement.

12. *The cost table for alternative 3a indicates the soil is being disposed in a Class II landfill whereas the alternative description says Class I. Please be consistent.*

The cost table contains a typographical error; it should indicate the soil is being disposed of at a Class I landfill. Revised tables are attached.

13. *Section 6.1. Alternative 2 is not necessarily more effective that Alternative 3... This section should be revised to indicate thermal desorption is more effective.*

We agree that thermal desorption has the potential to be more effective than off-site disposal. Thermal desorption is an established method of PAH destruction, and it also has been used successfully for PCB destruction. However, there is some uncertainty associated with the level of effectiveness for PCB destruction. If the thermally treated PCB-contaminated soils did not meet the target cleanup levels, some or all of the thermally treated soils would still require off-site disposal. Additionally, thermal desorption is not applicable to the lead-contaminated soils; therefore, an alternative treatment method or disposal is required for all Area B soils. Therefore, given the range of soil contaminants present at the site, we feel that Alternative 2 is, overall, a more effective alternative.

14. *Section 7.0. This section should include the assumptions that were used to determine the recommended alternative. In particular; the assumption that the soil is not a hazardous material should be stated. If the soil is a hazardous material, then alternative 3 should be recommended.*

    The recommendation made in Section 7.0 was intended to be conditional. We currently do not have enough information to determine how the soil will be classified. However, based on the following factors, we recommended excavation with off-site disposal regardless of the soil's classification:

    - the relatively small volume of soil to be excavated
    - the high degree of certainty associated Alternative 2
    - the ease of implementation of Alternative2
    - the very high treatment costs associated with Alternative 3

15. *Reference Section. Many of the referenced documents/sources are not included in this section. The list of references should be complete.*

    All the reports referenced in the text are included in the References section. Regulatory citations are note included in the Reference Section because the citation itself is specific enough to allow the reader to locate the source.

16. *Appendix, Cost Tables, p. 4. The estimate of quantity of excavation and loading is 3,610 tons. How was this quantity calculated?*

    There was an error in the quantity of soil to be loaded and excavated in alternatives 3a and 3b. Revised cost tables are attached.

DTSC Comments

General Comments

Executive Summary

A. *The Executive Summary discusses a great deal about the NCP rules and site history. It barely discusses the issues and it does not clearly identify the threat.... The Executive Summary should:*

    1. *State the purpose of the EE/CA clearly and completely.*

    2. *Identify the contaminants and chemicals of concern within each medium.*

    3. *Clearly identify the proposed alternative.*

    4. *Describe other alternatives that were considered.*

    5. *Provide information on how the public can be involved in the process.*

6. *Explain when the removal action will be completed.*

7. *Explain previous efforts to mitigate the threat.*

The executive summary should be modified to include the following paragraph:

The purpose of this removal action is to protect human health and the environment by removing potential sources of carcinogenic and high risk contaminants from the soil. These non-TPH contaminants include PCBs, cPAHs, lead, arsenic, manganese, and beryllium. The proposed alternative for this removal action is to excavate the soils and dispose of them at an appropriate facility. Other alternatives considered included: 1) taking no further action and 2) utilizing thermal desorption technology for some areas of the site. The public may be involved by reviewing this document during the 30 day review period that will start on March 18, 1996. The removal action is scheduled for May 1996. Previous efforts to mitigate the threat at this site include the removal of the tanks and associated facilities, as well excavating approximately 140 cubic yards of contaminated soil from the bermed areas. This EE/CA is for a soils removal action only; groundwater will be addressed in the Parcel B ROD.

Site Characterization

8. *Explain how the principle threat has been both identified and addressed in the removal action. It is important to state the nature and extent of what has been detected so far, and what and why certain data have been used to screen this data.*

   The objectives of this removal action are to reduce the overall threat to human health and the environment posed by non-TPH contaminants in the soil at IR-6. These contaminants, which include PCBs, cPAHs, lead, arsenic, beryllium, and manganese, are present at levels above the TCLs. The TCLs were determined based on the ambient metal concentrations in the soil and/or the EPA Region IX PRGs for metals and cPAHs. Data used to identify the nature and extent of this contamination includes HLA's RI investigation and CH2M HILL confirmation sampling. This removal action addresses potential sources of high risk and carcinogenic compounds, thereby reducing the threat to groundwater and minimizing future human exposure to contaminated surface soil.

9. *Describe the purpose and results of the treatability study. The report needs to also include how the treatability study will affect the proposed removal action.*

   We have not described the treatability study because it does not relate to this removal action. As discussed in the July 12, 1995 meeting between the Navy, DTSC, EPA, and CH2M HILL, the removal action is for non-TPH contaminants only. The treatability study was performed as part of the bioremediation pilot study that is using TPH-contaminated soils from the Tank Farm site.

Identification of Removal Action Objectives

10. *Clarify why the removal action focuses on the soil while the threat from the groundwater is equal.*

As discussed in the July 12, 1995 meeting between the Navy, DTSC, EPA, and CH2M HILL, groundwater contamination is a Parcel-wide issue and will be addressed in the Parcel B ROD. It would not be feasible to address groundwater at this site without addressing the remainder of the parcel. Also, because the soil included in this removal action is predominantly above the groundwater, it was decided that groundwater would not be addressed in this removal action.

11. *Provide reason(s) for the proposed project boundary of the removal action. For example....*

    The boundaries of the project have been redrawn to include all areas currently assigned to IR-6 as per the Risk Assessment produced by PRC. We have also included additional areas which were not included in IR-06 or other adjacent IR sites within our project boundaries. Please refer to the updated project and IR-06 boundaries presented in the attached Figure 2-2.

12. *Describe the impact of the removal action on the groundwater and vice versa...*

    Based on the anticipated depths of contamination, the vast majority of the soil included in the removal action is above the groundwater table; therefore, the potential impacts of recontamination of the soil by the groundwater are minimal. However, the removal action will have a positive effect on the groundwater because the source for many constituents will be removed. As discussed in our response to Comment 10, groundwater is not part of this removal action.

13. *Explain how the selected alternative meets the State ARARs.*

    The handling and disposal of soils as described meets State RCRA requirements. In addition, the excavation will be conducted in a manner that compiles with BAAQMD 6-305 requirements.

14. *Include an implementation schedule.*

    A revised implementation schedule is attached.

15. *Clearly state the different phases of the removal action....Further it is important to state the purpose of the removal action in additions to its reasons throughout the report...*

    The removal action is planned in one phase - the TPH-contaminated soil is not included in the removal action. Although TPH contamination will likely be present in much of the soil to be excavated during the removal action, it is not the constituent of concern. A previously mentioned, we will add a section discussing the removal action objectives.

Specific Comments

16. *Section 1.1, please explain how "this removal action fits in with the overall cleanup at Parcel B." What is the "overall cleanup" at Parcel B?*

    The objectives of this removal action are to reduce the overall threat to human health and the environment posed by non-TPH contaminants in the soil at IR-6. These contaminants, which include PCBs, cPAHs, lead, arsenic, beryllium, and manganese, are present at levels above the target cleanup level, as defined by ambient conditions and PRGs. This removal action fits into the overall cleanup strategy that the Navy has for the parcel, since it removes potential sources of high risk and carcinogenic compounds, thereby reducing the threat to groundwater and minimizing future human exposure at the surface. The groundwater and remaining soil contamination will be addressed by the RI/FS for Parcel B.

17. *Section 1.3, the objective and the content seem to contradict. Please explain how, despite its ominous threat to the environment and possibly to human health, the groundwater is excluded.*

    As discussed in the July 12th meeting between CH2M HILL, the Navy, DTSC, and EPA, groundwater contamination at Hunters Point is a site-wide or parcel-wide issue. It does not make sense to address groundwater for this site alone. Because the non-TPH contamination is primarily above the groundwater, we agreed that the groundwater would not be addressed in this EE/CA. Please refer to the response for Specific Comment Number 10.

18. *Section 1.3, we find the information to be boilerplate....*

    Please refer to the response for Specific Comment Number 16.

19. *Section 2.1.1, it is important to correct the nomenclature. The agencies accepted the Navy proposal to divide the installation into six parcels. Please correct.*

    Agreed. Section 2.1.1 should be amended to say that HPA was divided into five land parcels (A through E) and one parcel (F) consisting of subtidal lands.

20. *Figure 2-2, it is important to identify the boundary of the "project". It is not clear...*

    Please refer to the response for Specific Comment Number 11.

21. *Section 2.2.3, it is not clear why there have been additional sampling. Please explain why it was necessary to take those samples.*

    Confirmation sampling in the bermed area was performed because we had some information indicating that soil had been removed subsequent to HLA's investigation. Therefore, we collected samples to better define the current conditions in those areas. In other locations, the samples were collected to confirm the presence of contamination above target cleanup levels in HLA's identified "hotspots".

ATTACHMENTS

2.3 Nature and Extent of Contamination

The main potential sources of contamination at the Tank Farm are spills from the tanks used by the Navy to store diesel fuel, lubrication oil, and possibly Stoddard solvents. These tanks were also reportedly used by Triple A to store unknown materials. The potential non-point sources of contamination at the Tank Farm include naturally occurring geologic materials, anthropogenic sources, and artificial fill materials.

The primary contaminants observed in the soil at the Tank Farm consist of petroleum hydrocarbons (TPH-diesel and TPH-oil), PCBs, lead and cPAHs. Other secondary contaminants have also been detected at the site, including VOCs such as BTEX and chlorinated solvents, PAHs, and several metals. Tables summarizing the results of HLA's subsurface investigation are included in Appendix I of the RI (HLA, 1992b). Table 2-1 presents the results of CH2M HILL's confirmation sampling. As discussed in Section 2.2.3, contaminant concentrations encountered during CH2M HILL's confirmation sampling were generally lower than concentrations encountered by HLA. It is likely that much of the shallow metals and cPAH contamination encountered by HLA in the bermed areas was excavated during the removal action conducted in June 1993.

The ambient levels of several metals at HPA were calculated by PRC. Table 2-2 presents the minimum and maximum concentration of metals detected at the Tank Farm site as well as the estimated ambient levels. The contaminant concentration information presented in Table 2-2 is based on data obtained during HLA's RI investigation. As shown, metals present at above ambient levels include: antimony, arsenic, barium, beryllium, copper, lead, manganese, selenium, silver, and zinc.

Detections of metals above ambient levels were encountered primarily in shallow or surface samples in the bermed areas. Lead and zinc, the most commonly detected contaminants, were found in each of the four bermed areas; the remaining metals were detected in one or more of the bermed areas or in the paved areas of the site. Figure 2-5 presents the locations and concentrations of metal detections above the estimated ambient levels. The concentrations in the figure represent the maximum concentration for each location. CH2M HILL confirmation samples are not included on Figure 2-5; however, the results of the confirmation sampling are presented in Table 2-1.

PCBs were detected at depths up to approximately 6 feet, primarily in the concrete-paved area outside of the former lube oil facility. PCBs were also detected in the berm that contained the 12,000-gallon lube oil tank (Tank 9). Based on information presented in HLA's RI, PCBs were found in Tank 7 (Figure 2-2); however, no PCBs were detected in the soil near this area. It is likely that the PCB contamination in the concrete-paved area is due to leakage from a storm drain line that runs from the Tank 9 bermed area. The drain line, which is located approximately 5 feet below grade, runs near the areas where PCBs were detected. Refer to Figure 2-6 for the locations and concentrations of PCB detections.

Carcinogenic PAHs were encountered throughout the site. In the bermed areas and asphalt-paved area, the cPAHs were predominantly encountered in shallow or surface samples. In the concrete-paved area, cPAHs were detected at up to approximately 5 feet below grade. The highest concentration of cPAHs were encountered in the bermed area that formerly contained the eight 3,000-gallon lube oil tanks. Figure 2-7 shows the locations and total concentrations of cPAH detections.

TPH contamination was encountered throughout the site and extends to depths of approximately 12 to 15 feet bgs. The highest concentrations of TPH contamination were encountered in the bermed areas and are likely the result of tank spills. TPH contamination is not within the scope of this removal action.

Groundwater contamination at the site includes the soil contaminants. BTEX compounds and chlorinated solvents are relatively mobile in soil and groundwater and are found 150 feet downgradient of the Tank Farm. PAHs, TPH-diesel, TPH-oil, and metals are fairly immobile, with the exception of arsenic.

The evaluation of the nature and extent of contamination is based primarily on the results of HLA's RI investigation. HLA concluded that although many qualifiers were added to the data, a final evaluation of the data set indicated that the data are of good overall quality. The data was deemed usable for site assessment, risk assessment, and feasibility studies. A Data Validation and Evaluation Report is presented as Appendix C of the RI (HLA 1992b).

4.1 Delineation of Removal Action Areas

As described in Section 2.3, the Tank Farm site contains both organic and inorganic contaminants. Because treatment alternatives vary for inorganic and organic compounds, the soil has been categorized into Types A and B. Figure 4-1 identifies the areas containing Types A and B soils. The estimated volumes of the two soil types are:

- Type A 1620 cubic yards
- Type B 400 cubic yards

Type A soils are located in the flat paved section of the site. Contaminants of concern contained in Type A soil include PCBs and cPAHs. Some low-level concentrations of metals have been detected in areas containing Type A soil; however, the concentrations are below the target cleanup levels and do not have the potential to cause the soil to be classified as a hazardous waste. PCBs and cPAHs were encountered at depths of up to 6 feet below grade in Area A1; therefore, Area A1 will be excavated to a depth of approximately 6 feet. In Areas A2 and A3, cPAHs were encountered in the surface samples; therefore, these areas will be excavated to approximately 2 feet below ground surface (bgs). In Area A4, cPAHs were encountered to depths of approximately 5 feet bgs; therefore, this area will be excavated to approximately 5 feet bgs.

Type B soils include either elevated concentrations of metals or elevated concentrations of both metals and organics. Type B soil is located predominantly in the bermed areas, although there are several small areas in the paved section of the site that has soil designated as Type B. The following table summarizes the constituents and depths of excavation for Area B soil.

Area	Constituents	Anticipated Depth of Excavation
B1	lead, manganese, beryllium, cPAHs, PCBs	2 feet
B2	lead	1 foot
B3	lead, arsenic, manganese	2 feet
B4	lead	1 foot
B5	manganese	2 feet
B6	beryllium	6 feet
B7	beryllium	2 feet
B8	beryllium	2 feet
B9	PCBs, manganese	5 feet

Table 2-2
Ambient Concentration of Metals
Tank Farm IR-6
Hunters Point Annex

Chemical	Number of Samples Analyzed	Minimum Detected Value (mg/kg)	Maximum Detected Value (mg/kg)	Estimated Ambient Level[a] (mg/kg)	Number of Samples > Ambient Levels
Antimony	123	8	29	9.05	13
Arsenic	123	0.31	57	11.1	1
Barium	123	9	428	314	7
Beryllium	123	0.18	1	0.71	6
Cadmium	123	0.94	3	3.14	0
Chromium	123	40	1910	2238 - 160,111	0
Cobalt	123	8	208	1656 - 118,546	0
Copper	123	6	140	124	3
Lead	123	0.67	2580	8.99	60
Manganese	123	169	4640	1430	10
Mercury	123	0.1	0.98	2.28	0
Molybdenum	123	2	2	2.68	0
Nickel	123	22	3390	3201 - 907,631	0
Selenium	123	0.57	3	1.95	1
Silver	123	0.31	2	1.43	1
Thallium	123	0.38	0.79	0.81	0
Vanadium	123	8	102	117	0
Zinc	123	17	597	110	22

Notes:
a Table 8, Summary of Ambient Levels by Soil Type, Hunter's Point Annex. Values presented are for undifferentiated fill.
Chromium, cobalt, and nickel background values are correlated to the range of magnesium concentrations present.

Hunter's Point Annex Feasibility Study
Alternative 1: No Action
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$0	
No Action Required			$0		
B) Groundwater Monitoring				$0	
No New Groundwater Monitoring Well			$0		
CONSTRUCTION COST SUBTOTAL				$0	
Mobilization & Gen'l Reqm'ts @ 5%				$0	
CONSTRUCTION COST SUBTOTAL				$0	
Contingencies					
Scope Contingency @ 25%				$0	
				$0	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$0	
IMPLEMENTATION COST TOTAL				$0	
Engineering/Design @ 5%				$0	
CAPITAL COST TOTAL				$0	
ANNUAL OPERATIONS & MAINTENANCE COST					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
Estimated Capital Cost (from above)				$0	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 2A: Excavation and Disposal in Class I Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity		Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS						
A) Soil Remediation					$648,320	
Excavation and Loading	3,140	TN	$8	$25,120		a
Trans/Disposal Costs to Class I Landfill	3,140	TN	$180	$565,200		b
Purchase/Compact Backfill	2,000	CY	$20	$40,000		a
Field Management	6	WK	$3,000	$18,000		a
B) Confirmation Sampling					$21,000	
CH2M HILL Labor	1	LS	$6,400	$6,400		d
Analytical Costs	1	LS	$14,600	$14,600		d
C) Groundwater Monitoring					$18,000	
Well Abandonment	4	WELLS	$1,000	$4,000		e
Well Installation	4	WELLS	$3,500	$14,000		e
CONSTRUCTION COST SUBTOTAL					$687,320	
Mobilization & Gen'l Reqm'ts @ 5%					$34,400	
CONSTRUCTION COST SUBTOTAL					$721,720	
Contingencies						
Scope Contingency @ 25%					$180,000	
					$901,720	
Other Costs						
Administrative, Legal and Services During Construction @ 5%					$45,000	
IMPLEMENTATION COST TOTAL					$946,720	
Engineering/Design @ 5%					$47,000	
CAPITAL COST TOTAL					$993,720	
ANNUAL OPERATIONS & MAINTENANCE COST (30 Years Total Duration)						
A) Soil Remediation--No Cost					$0	
B) Groundwater Monitoring--No Cost					$0	
TOTAL ALTERNATIVE COST					$993,720	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 2B: Excavation and Disposal in Class II Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity		Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS						
A) Soil Remediation					$193,020	
Excavation and Loading	3,140	TN	$8	$25,120		a
Trans/Disposal Costs to Class II Landfill	3,140	TN	$35	$109,900		c
Purchase/Compact Backfill	2,000	CY	$20	$40,000		a
Field Management	6	WK	$3,000	$18,000		a
B) Confirmation Sampling					$21,000	
CH2M HILL Labor	1	LS	$6,400	$6,400		d
Analytical Costs	1	LS	$14,600	$14,600		d
C) Groundwater Monitoring					$18,000	
Well Abandonment	4	WELLS	$1,000	$4,000		e
Well Installation	4	WELLS	$3,500	$14,000		e
CONSTRUCTION COST SUBTOTAL					$232,020	
Mobilization & Gen'l Reqm'ts @ 5%					$11,600	
CONSTRUCTION COST SUBTOTAL					$243,620	
Contingencies						
Scope Contingency @ 25%					$61,000	
					$304,620	
Other Costs						
Administrative, Legal and Services During Construction @ 5%					$15,000	
IMPLEMENTATION COST TOTAL					$319,620	
Engineering/Design @ 5%					$16,000	
CAPITAL COST TOTAL					$335,620	
ANNUAL OPERATIONS & MAINTENANCE COST						
A) Soil Remediation--No Cost					$0	
B) Groundwater Monitoring--No Cost					$0	
TOTAL ALTERNATIVE COST					$335,620	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 3A: Thermal Desorption with Excavation and Disposal in Class I Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$623,745	
Excavation and Loading	3,140 TN	$8	$25,120		a
Thermal Desorption Treatment	2,515 TN	$175	$440,125		f
Backfill Treated Soil	2,000 CY	$5	$10,000		a
Trans/Disposal Costs to Class II Landfill	625 TN	$180	$112,500		a
Field Management	12 WK	$3,000	$36,000		b
B) Confirmation Sampling				$21,000	
CH2M HILL Labor	1 LS	$6,400	$6,400		c
Analytical Costs	1 LS	$14,600	$14,600		c
C) Groundwater Monitoring				$18,000	
Well Abandonment	4 WELLS	$1,000	$4,000		d
Well Installation	4 WELLS	$3,500	$14,000		d
CONSTRUCTION COST SUBTOTAL				$662,745	
Mobilization & Gen'l Reqm'ts @ 5%				$33,100	
CONSTRUCTION COST SUBTOTAL				$695,845	
Contingencies					
Scope Contingency @ 25%				$174,000	
				$869,845	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$43,000	
IMPLEMENTATION COST TOTAL				$912,845	
Engineering/Design @ 5%				$45,642	
CAPITAL COST TOTAL				$958,487	
ANNUAL OPERATIONS & MAINTENANCE COST (30 Years Total Duration)					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
TOTAL ALTERNATIVE COST				$958,487	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Hunter's Point Annex Feasibility Study
Alternative 3B: Thermal Desorption with Excavation and Disposal in Class II Facility
Order of Magnitude Level Construction Cost Estimates
Project No. 102594.01.AM November 13, 1995

Cost Component Description	Quantity	Unit Price	Component Cost	Category Subtotal	Notes
CAPITAL COSTS					
A) Soil Remediation				$533,120	
Excavation and Loading	3,140 TN	$8	$25,120		a
Thermal Desorption Treatment	2,515 TN	$175	$440,125		f
Backfill Treated Soil	2,000 CY	$5	$10,000		a
Trans/Disposal Costs to Class II Landfill	625 TN	$35	$21,875		c
Field Management	12 WK	$3,000	$36,000		a
B) Confirmation Sampling				$21,000	
CH2M HILL Labor	1 LS	$6,400	$6,400		d
Analytical Costs	1 LS	$14,600	$14,600		d
C) Groundwater Monitoring				$18,000	
Well Abandonment	4 WELLS	$1,000	$4,000		e
Well Installation	4 WELLS	$3,500	$14,000		e
CONSTRUCTION COST SUBTOTAL				$572,120	
Mobilization & Gen'l Reqm'ts @ 5%				$28,600	
CONSTRUCTION COST SUBTOTAL				$600,720	
Contingencies					
Scope Contingency @ 25%				$150,000	
				$750,720	
Other Costs					
Administrative, Legal and Services During Construction @ 5%				$38,000	
IMPLEMENTATION COST TOTAL				$788,720	
Engineering/Design @ 5%				$39,400	
CAPITAL COST TOTAL				$828,120	
ANNUAL OPERATIONS & MAINTENANCE COST					
A) Soil Remediation--No Cost				$0	
B) Groundwater Monitoring--No Cost				$0	
TOTAL ALTERNATIVE COST				$828,120	

The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

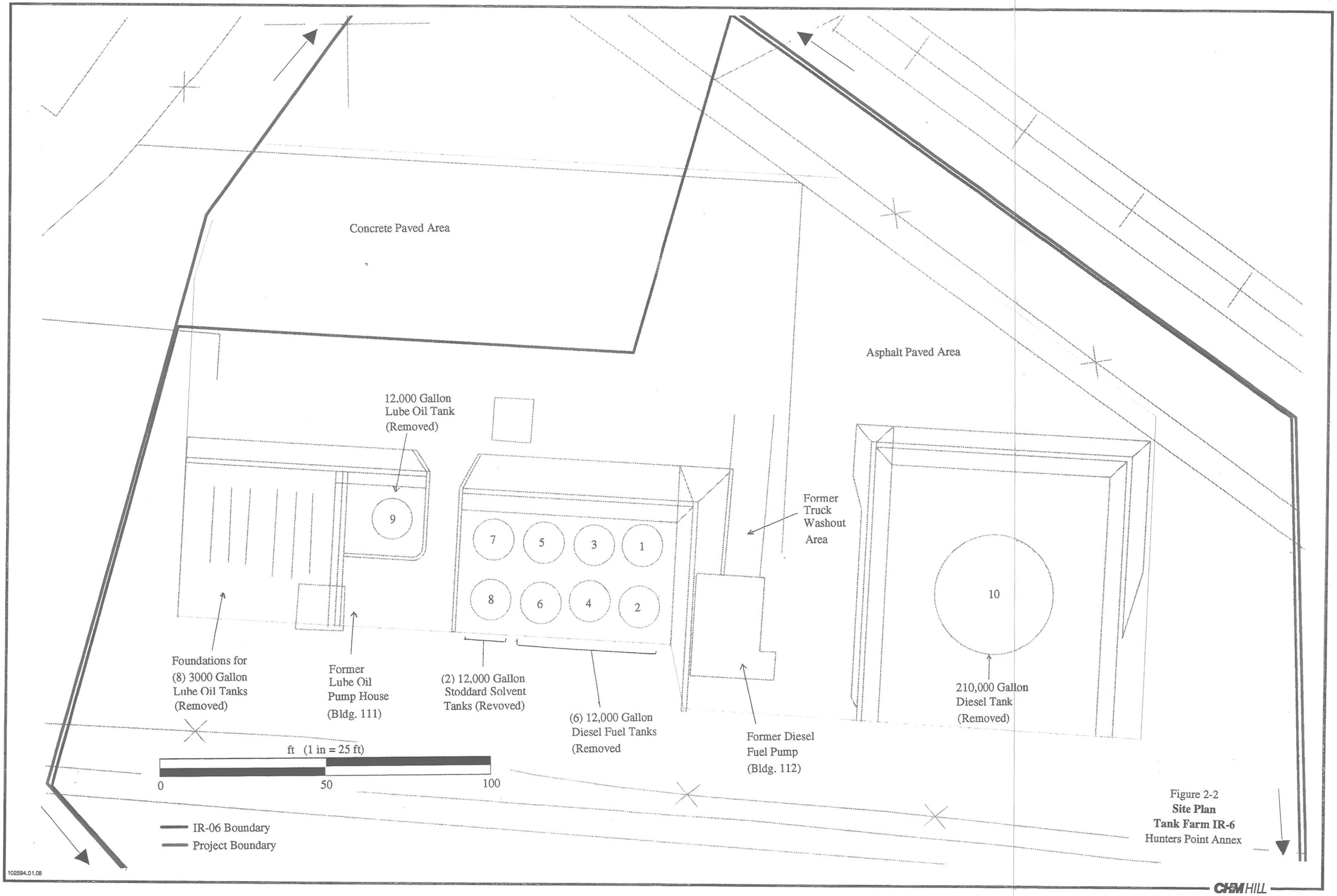


Figure 2-2
Site Plan
Tank Farm IR-6
Hunters Point Annex

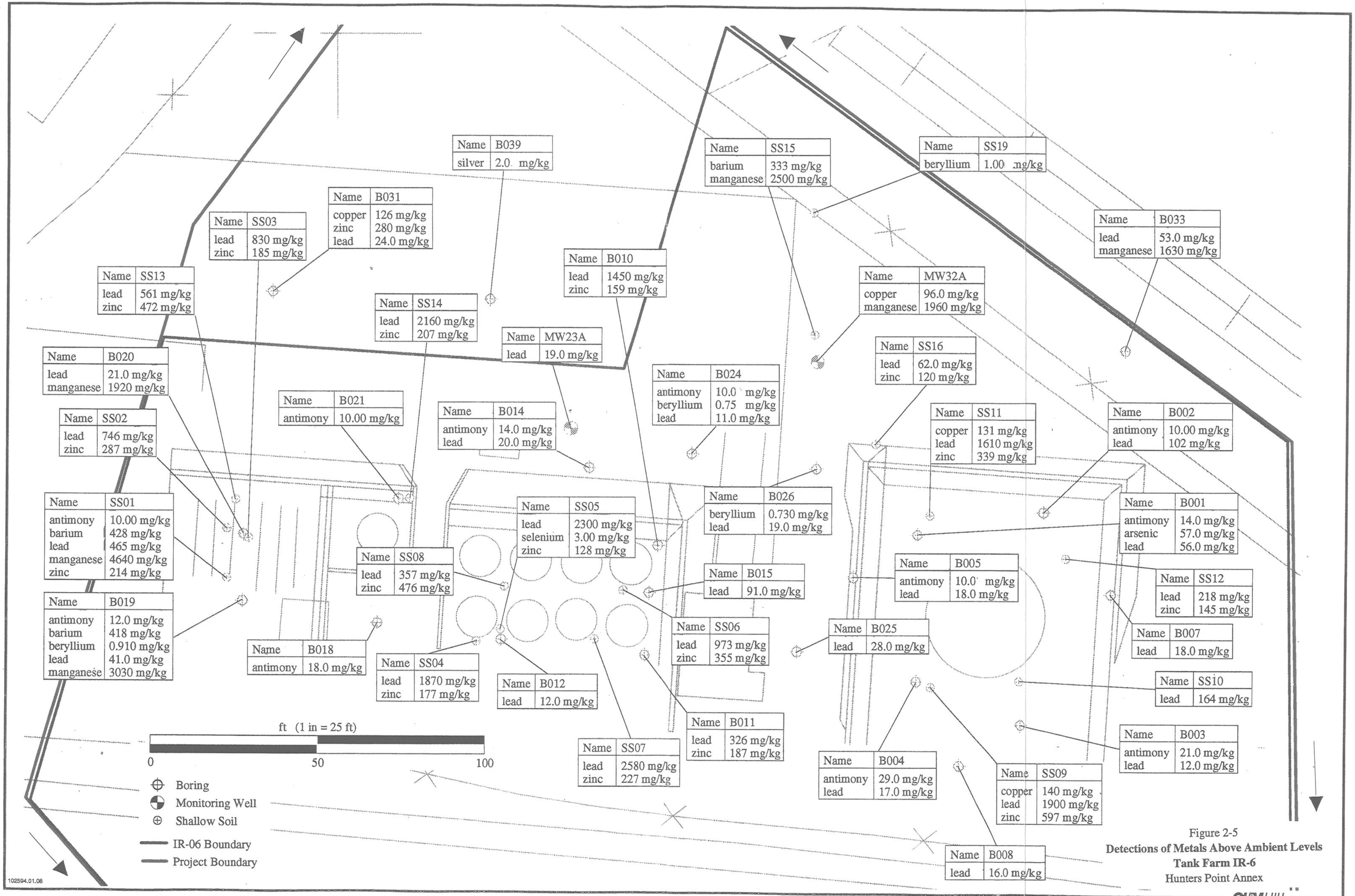


Figure 2-5
Detections of Metals Above Ambient Levels
Tank Farm IR-6
Hunters Point Annex

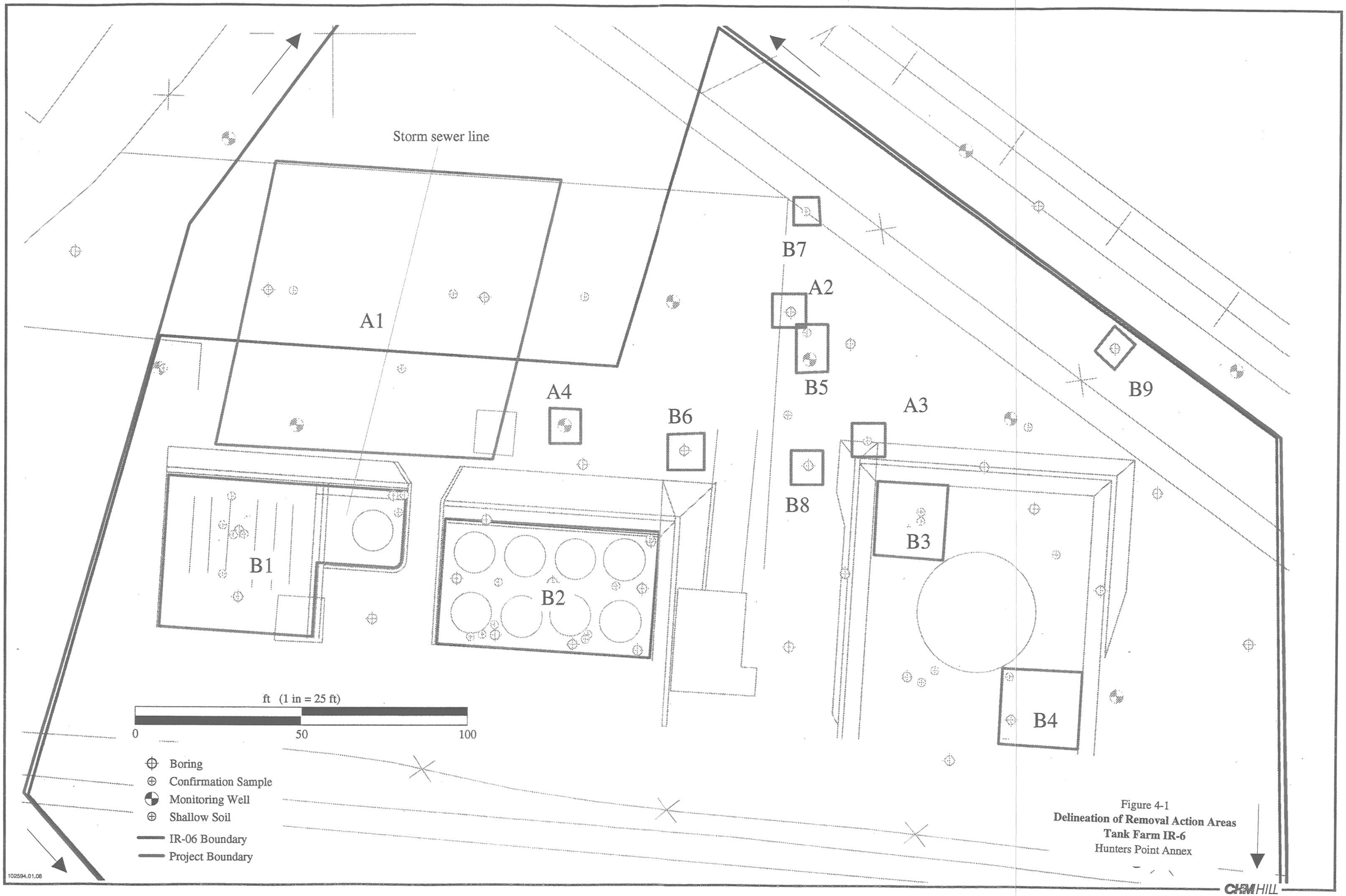


Figure 4-1
Delineation of Removal Action Areas
Tank Farm IR-6
Hunters Point Annex